HEALTH SERVICES, SCHOOLS, ATTITUDES, AND CONTRACEPTIVE USE: TESTS OF A THEORETICAL MODEL AMONG RURAL NEPALESE

by

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DEDICATION

To my parents, who showed me that this is what Brauners do.

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ABSTRACT

This dissertation uses new, highly detailed measures of dimensions of social context to advance our understanding of both attitudinal and programmatic mechanisms through which social context influences individual behavior. To illustrate, I focus on the relationship between dimensions of social context, specifically health services and schools, and contraceptive use in Nepal. Using data from the Chitwan Valley Family Study I employ multiple estimation techniques including multilevel-logistic and OLS regressions and discrete-time hazard modeling.

To investigate the potential role of attitudinal mechanisms I explore how the health service and school contexts influence individuals' attitudes about contraceptive methods, family size and composition, children, family, and non-family behaviors and how both context and these attitudes independently influence individuals' contraceptive use. I find that women with positive attitudes about contraceptive methods and less family-oriented attitudes had higher rates of contraceptive use. Furthermore, women's attitudes about children and family had strong effects independent from those of attitudes about contraception, indicating that these less closely connected attitudes play an integral part in women's contraceptive use.

When investigating the role of programmatic mechanisms I examine the separate effects of the provision of family planning, child, and maternal health services and, for schools, the effects of curriculum, teacher gender and training, students' gender, and education costs. Because health service providers and schools are associated with a specific place, as new ones are built or existing ones change the services they offer, the

distribution of these dimensions across physical space changes. Furthermore, because information about health services and schools is transmitted throughout communities through social channels, their potential realm of influence is also geographically disperse. Consequently, I use an expanded conceptualization of the influence of social context and estimate models with geographically weighted measures of health services and schools that incorporate all the providers and schools in the study area. My analyses using these geographically weighted measures indicate that these dimensions of health services and schools all influence contraceptive behavior. I also find evidence that women's attitudes about children, the importance of childbearing, and roles within the family are mechanisms through which health services and schools influence contraceptive use.

CHAPTER 1

INTRODUCTION

A fundamental aspect of sociological inquiry concerns the effect social context has on the individual (Alexander 1988; Caldwell 1982; Durkheim [1933] 1984). Although empirical tests have become increasingly common, there are still many unanswered questions regarding the exact nature of this relationship (Billy and Moore 1992; Morenoff 2003; Morenoff, Sampson, and Raudenbush 2001). In particular, the specific mechanisms linking context to individuals have remained elusive. This dissertation uses new, highly detailed measures of multiple dimensions of social context to significantly advance our understanding of the relationship between social context and individual behavior. To illustrate this relationship I focus on the relationship between dimensions of health services and schools and contraceptive use. A substantial existing body of literature reveals that health services and schools are related to individual's contraceptive use. However, again, much less is known about the specific mechanisms at play. Understanding these mechanisms is important for advancing theories about the social world and for policy makers who want to design effective programs.

This dissertation focuses on both programmatic mechanisms, by looking at specific dimensions of social context, and social-psychological mechanisms, by looking at individuals' attitudes. When investigating the role of programmatic mechanisms I consider multiple dimensions of both the health service context and the school context.

For the health service context I examine the separate effects of the provision of family planning, child, and maternal health services and for schools I examine the effects of curriculum, teacher gender and training, the gender composition of the student body, and the cost of education. When thinking about how health services and schools influence individual's behavior, it is important to remember that both health service providers and schools, like many features of social context, are generally associated with a specific place. As new providers and schools are built and existing ones change the services they offer, the distribution of these dimensions of social context across physical space also changes. In this dissertation I explore new conceptualizations of exposure to these dimensions of social context by incorporating their changing geographic distribution into my empirical analysis.

To investigate the potential role of social-psychological mechanisms I explore how the health service and school contexts influence individuals' attitudes about contraceptive methods, family size and composition, children and family, and non-family behaviors and how both context and these attitudes independently influence individuals' contraceptive use. A substantial and growing body of evidence links attitudes and a closely related behavior, such as the relationship between attitudes about contraception and contraceptive use. However, little empirical work has investigated the relationship between attitudes in other domains and a specific behavior, such as attitudes about family members' roles and contraceptive behavior or attitudes about non-family activities and contraceptive behavior. There is also a dearth of literature examining the simultaneous effect of measures of attitudes from different domains on one behavior. The research presented in this dissertation is unique in that it includes models of the separate and

independent relationships between attitudes from multiple domains on one behavior, contraceptive use. By investigating the relationship between specific dimensions of health services and schools and individuals' attitudes and behavior the research proposed here will help illuminate some mechanisms through which social context influences the individual.

Contraceptive use is an important behavior to study for several reasons. First, with respect to the relationship between attitudes and contraceptive use, well-established theoretical frameworks and previous research point to a multitude of potentially influential attitudes (Ajzen 1985, 1991; Coale and Watkins 1986; Barber 2001; Edin and Kefalas 2005; Luker 1996). Yet there have been few opportunities to examine the simultaneous influence of various attitudes on contraceptive use. Second, in social demography, the macro-micro link mentioned above is often applied to family behaviors such as childbearing and contraceptive use (Brewster 1994; Dyson and Moore 1983; Entwisle and Mason 1985; McNicoll 1980). As a result, much previous research exists on the overarching relationship between social context and contraceptive use behavior. However, there is little empirical evidence regarding the specific programmatic and social-psychological mechanisms through which this effect occurs. The existing work provides a necessary foundation for the research I present here which provides valuable new insight. Third, examining contraceptive use and understanding how social context influences it may reveal more general information on how innovative behaviors are adopted and spread (Casterline 2001; Cleland and Wilson 1987). Innovation diffusion

theories of fertility typically consider the adoption of medical contraceptive methods[1] as an innovative behavior (Cleland 2001; Cleland and Wilson 1987; Retherford and Palmore 1983). For example, it may represent a transition from postnatal controls of family size to prenatal controls or from natural, homeopathic methods to Western, medical methods (Mason 1997). As an innovation, a widespread increase in medical contraceptive use can be thought of as a component of pervasive social change. To further our theoretical models of social behavior and to design and implement social policies it is crucial we understand how dramatic changes in social context actually influence the adoption of this type of new behavior.

This dissertation also provides new information on the overarching relationship between social context and individual behavior by empirically modeling this relationship in Nepal—a country that has recently undergone dramatic social, economic, and demographic change. Many sociological and social demographic theories are designed to predict changes in family formation resulting from changes in social context, particularly from changes in the health and educational context (Coale 1973; Easterlin and Crimmins 1985; Mason 1987, 1997; Notestein 1953; Thornton and Lin 1994). However, because of data limitations, efforts to test these theories are often limited to Western countries or other countries with already high levels of non-family opportunities and organizations, low fertility levels, and widespread use of contraceptives. This lack of empirical tests of these theories in settings currently undergoing rapid social change is a notable limitation

[1] I use the terms medical or Western contraceptive methods in this section to distinguish sterilization, hormonal methods, IUDs, condoms, and foams from herbal or more organic barrier methods or postnatal controls that may have been used by this population in the past. For parsimony and ease to the reader, I drop the explicit reference to medical or Western methods and use the term "contraceptive methods" throughout the remainder of this dissertation, but I refer to only sterilization, hormonal methods (oral contraceptive pills, Depo-Provera, and Norplant), IUDs, condoms, and foams with this term.

of the demographic literature on the relationship between social context and individual behavior (Axinn and Barber 2001; Caldwell 1982; Lloyd, Kaufman, and Hewett 2000; Yabiku 2004). The research proposed here will provide new information aimed at addressing this weakness.

Chitwan Valley, Nepal is an ideal location for testing these theories. Recently, that is within the lifetime of those currently living, Nepal entered a period of dramatic social change marked by the rapid proliferation of markets, employment opportunities, schools, and health services. Simultaneously, it shifted from having extremely high fertility and no use of contraceptives, to having lower fertility and more widespread use of contraceptives. This is the very type of setting these theories of fertility decline were designed to explain.

The Chitwan Valley, in particular, has additional features that make it an ideal study area. First, there is a clear point in time when the area began to be widely populated and when the social context began to change with the building of health services, schools, and other community services. In the 1950s the government began an extensive campaign to clear the largely uninhabited jungle that existed in Chitwan Valley and encouraged migration down from the higher altitude regions. Because this time is finite and recent it is possible to document these changes in detail. Second, the pace of demographic and social change in this area was quite rapid. Over the lifetime of an individual the area went from virgin jungle to a thriving metropolis, the average total fertility rate dropped dramatically, and the use of contraceptive methods grew from virtually none to roughly half the women of childbearing age using a method at least once. The resulting social and behavioral change and variation allows me to estimate complex behavioral models.

Third, due to the migration policies after the land was cleared, the area contains a heterogeneous population of multiple ethnic and religious groups. This provides additional variation in demographic behaviors and in attitudes allowing me to empirically examine the relationships discussed above.

The aim of this dissertation is to find empirical answers to four specific questions about the relationship between dimensions of health services and schools and women's contraceptive use. These questions are: 1) Which attitudes are related to contraceptive use behavior? 2) Which dimensions of health services and schools influence attitudes related to contraceptive use? 3) Which dimensions of health services and schools influence contraceptive use behavior? and 4) Which attitudes act as mechanisms through which dimensions of health services and schools influence contraceptive use behavior? To address these questions I use data from the Chitwan Valley Family Study (CVFS) to investigate the independent effects of dimensions of health services and schools on individual's fertility related attitudes (e.g. desired family size and expected family members' responsibilities) and contraceptive use behavior and to test the relative consequences of variation in dimensions of health services and schools for individuals' attitudes and behavior.

I now give a brief summary of this research and how it is presented in this dissertation. In Chapter 2 I provide a detailed description of my overarching theoretical framework and the theories and frameworks I rely on in its construction. I draw largely on the fertility supply and demand framework (Becker 1960, 1991; Easterlin and Crimmins 1985), the modes of social organization framework (Thornton and Fricke 1987; Thornton and Lin 1994), the theory of planned behavior (Ajzen 1991; Madden,

Ellen, and Ajzen 1992; Fishbein and Ajzen 1975), and innovation diffusion theories of fertility (Bongaarts and Watkins 1996; Casterline 2001; Coale and Watkins 1986) in forming my theoretical framework. Taken together these frameworks yield three dominant causal pathways through which health services and schools influences behavior: health services and schools directly influence contraceptive use; health services and schools directly influence attitudes; and attitudes directly influence contraceptive use.

In Chapter 3 I describe the specific setting for this research, Chitwan Valley, Nepal. This chapter gives a brief discussion of the economic, social, and demographic history of Chitwan Valley with additional detail on how attitudes and contraceptive use have changed over time. I also present a detailed description of the specific changes in the health service and school contexts, paying particular attention to how the specific dimensions of these contexts have changed over geographic space and time. This chapter also includes a discussion on the policy significance of studying these relationships in this setting.

Chapter 4 contains descriptions of the data and methods I use in this dissertation. The descriptions of the data are quite detailed, but I present only basic information on the specific measures and analytic approaches I use. In later chapters I present more detailed information on the analyses presented in that specific chapter. This chapter also includes a detailed discussion of patterns of contraceptive use among the women in my analysis sample.

Chapter 5 is the first analytic chapter—in it I explore the relationship between attitudes and contraceptive use. I consider four domains of attitudes—those about contraceptives, family size and composition, children and family, and non-family

behaviors—and model the relationship between multiple measures of attitudes in each domain and the hazard of contraceptive use. For contraceptive use, I create five different specifications: any contraceptive use; sterilization only; the use of Depo Provera, the most common contraceptive method used in Nepal; and the use of oral contraceptive pills and condoms separately, the two most common temporary or short-term contraceptive methods used.

In Chapters 6 and 7 I present analyses of the full model of the complex relationship between social context, attitudes, and behavior. Chapter 6 focuses on the health service context and Chapter 7 on the school context. Both chapters include four sets of models. The first set models the effects of measures of social context on attitudes about children and family. This set contains models that look at the closest health service provider or school to the individual and models that simultaneously consider all the health service providers or schools in the study area. The second set models the relationship between these attitude measures and the hazard of contraceptive use. The third set of models in Chapters 6 and 7 are of the effect of the measures of social context on the hazard of contraceptive use, again looking at multiple specifications of social context. The fourth and final set of models combine the previous ones, estimating the effect of both the measures of social context and of attitudes on the hazard of contraceptive use. These final models allow me to determine the extent to which attitudes are a potential mechanism through which social context influences individual behavior.

Finally, Chapter 8 is a discussion and conclusion chapter. I provide brief summaries of the empirical results in Chapters 5-7 and discuss the implications of these findings in terms of theoretical, program, and policy development.

CHAPTER 2

THEORETICAL FRAMEWORK

This chapter presents the overarching theoretical framework that guides my research. The core of this framework is that attitudes are a mechanism through which social context influences contraceptive use (see Figure 2.1 for a heuristic diagram). The framework integrates key concepts from innovation diffusion and ideational change theories of fertility (Bongaarts and Watkins 1996; Cleland and Wilson 1987; Lesthaeghe 1983; Lesthaeghe and Surkyn 1988), economic theories of fertility (Becker 1960, 1991; Easterlin and Crimmins 1985), the modes of social organization framework (Thornton and Fricke 1987; Thornton and Lin 1994), and the theories of planned behavior and reasoned action (Ajzen 1985, 1991; Ajzen and Madden 1986). In this chapter I describe this integration with three specific goals: first, to focus the framework on the use of any contraceptive method as an outcome as opposed to a broader theory of fertility or a more narrow theory of the termination of childbearing; second, to draw an explicit link between exposure to health services and schools on the one hand and contraceptive use on the other; and third, to highlight the potential role of attitudes as a mechanism for this link. More detailed descriptions of specific mechanisms and hypotheses appear in the individual analytic chapters (Chapters 5, 6, and 7).

(Figure 2.1, about here)

Innovation diffusion theories. To start, I consider the importance of focusing on any contraceptive use. Demographic and sociological theories that inform our understanding of and research on contraceptive use are typically broader theories about fertility decline or more specifically about the termination of childbearing (Becker 1960, 1991; Cleland and Wilson 1987; Caldwell 1982; Easterlin and Crimmins 1985). By looking at innovation diffusion theories we can easily expand our conceptual models to focus specifically on the use of any contraceptive method. These theories of the social interaction based spread (diffusion) of new behaviors (innovation, in this case use of birth control) arose in response to the mounting evidence in the 1970s and 1980s making it clear that economic theories were not sufficient to explain fertility transitions. Depending on the specific setting in question, the adoption of contraceptive methods can be thought of as an innovative behavior.[2] In the framework I construct here, the innovation lies not only with the limitation of fertility but also with using a new type of method to control births. Some argue that couples and families have always adjusted their family size with techniques such as holistic contraceptives, withdrawal, infanticide, or servitude (loaning or giving ones children to another household) (Mason 1997). However, Retherford and Palmore's (1983) characterization of a continuous innovation, meaning it is an adaptation of a behavior already in existence, is applicable here. Saying that the adoption of contraceptive methods is a continuous innovation does not in any way deny that there may previously have been significant efforts to control family size through pre and postnatal methods. Thus, in a setting of no widespread contraceptive use to control births,

[2] Recall I use the term contraceptive methods to include only sterilization, hormonal methods, IUDs, foam, and condoms.

I consider the adoption of contraception a key fertility innovation. The process of diffusion of this innovation is the topic of the present study.

Economic theories of fertility. At the foundation of most frameworks for studying fertility transitions are economic theories of fertility, often called demand theories (Becker 1960, 1991; Easterlin and Crimmins 1985). A key assumption of these theories is that individuals weigh the costs and benefits of using contraception and then act accordingly. In sociology and demography the costs of contraceptive use include psychic costs (e.g. stigma of remaining childless) and monetary costs (e.g. the actual price of a contraceptive method or the time spent to obtain the method) (Easterlin and Crimmins 1985). The benefits of contraceptive use arise from avoiding unwanted births.

Following from this, most theories addressing specific mechanisms that cause fertility transitions focus on the desires and motivations for having children, since the benefits of contraceptive use stem from desired fertility. It is a notable oversight that these theories do not explicitly address other motivations for using contraception. This theoretical disparity exists because each of these theoretical branches artificially attempts to separate the cost-benefit calculation regarding contraceptive use from that regarding the decision to have children. In reality these two calculations are not conducted separately. The alternative to using contraception is having children and as a result the costs and benefits of contraceptive use are intricately connected to the costs and benefits of childbearing. I illustrate this complex, inter-dependent relationship in Figure 2.2: the costs and benefits of contraceptive use 1) are influenced by the costs and benefits of childbearing and 2) determine actual contraceptive use behavior.

(Figure 2.2, about here)

In this combined heuristic model we are able to include any social or religious prescription regarding childbearing in the costs and benefits of contraceptive use. Also, because these benefits include the costs of childbearing, any costs associated with childrearing such as school tuitions or the cost of child vaccinations are also benefits of using contraception. By using contraception couples will avoid paying those child related costs. Desired family size itself is influenced by many factors which I include in this piece of the framework. For instance, because individuals must make decisions within a limited set of time, emotional, and financial resources, those who have strong educational or employment desires may also desire smaller families, thereby gaining more benefits from using contraception (Barber 2001, Plotnik 1992). A more detailed discussion of many of the determinants of the costs and benefits of contraceptive use can be found below and in the individual analytic chapters (Chapter 5, 6, and 7).

There have been several critiques of these economic based models of fertility decision making. Arguably most notable among these is that these frameworks rely too heavily on the assumption that individuals and couples are acting rationally when faced with the decision to use contraceptives (Luker 1996). However, this criticism is largely directed towards the application of this behavioral model to teenager's decision making, not to married adult women. This critique highlights the multitude of factors that influence contraceptive use decision making. It also suggests that a wide range of attitudes and beliefs may play a crucial role in an individual's assessment of the costs and benefits of using contraceptives. Edin and Kefalas (2005) show that the decision to have a non-marital birth is influenced by a range of factors including ideas about marriage,

manhood, family, and contraception. I discuss how attitudes fit into my framework in more detail below.

Theories of social context. I next expand the framework to explicitly incorporate social context, paying particular attention to how health services and schools influence the costs and benefits of contraceptive use. In constructing my theoretical framework for understanding the relationship between social context, attitudes, and behavior I follow what Cleland (2001) calls a "blended" diffusion model where both new ideas and social context influence behavior. I discuss the role of attitudes and ideas in a later section. Here I expand my framework to the left, incorporating contextual determinants of costs and benefits. For this piece, represented in Figure 2.3, I rely heavily on the modes of social organization framework (Axinn and Yabiku 2001; Thornton and Fricke 1987; Thornton and Lin 1994), on network or social influence theories (Bongaarts and Watkins 1996; Montgomery and Casterline 1996), and again on the ideational diffusion theories.[3]

(Figure 2.3, about here)

According to the modes of social organization framework, as new non-family organizations and services spread, activities move from within the family to outside the family (Axinn and Yabiku 2001; Thornton and Fricke 1987; Thornton and Lin 1994). This change along the continuum is an important part of the fundamental shift in the social organization of daily life that draws individuals out of social networks dominated by family members and into social networks linked to other non-family institutions and individuals (Coleman 1990; Thornton and Lin 1994). Once individuals begin to interact with non-family institutions, both their own ideas and their perceptions of others' ideas

[3] For simplicity I only show boxes for the costs and benefits of contraceptive use in this figure. However, those boxes represent the same ideas as described regarding the costs and benefits of contraceptive use and childbearing in Figure 2.2.

begin to change. This occurs through the formal and informal interactions individuals have with one another and interactions that individuals have with these non-family organizations (Bongaarts and Watkins 1996; Casterline 2001; Montgomery and Casterline 1996). These interactions have two consequences. First, they are situations in which social learning occurs. Individuals learn about new ideas and behaviors through conversations or through direct observation of others. Second, during these interactions individuals may be exposed to social influence. They may change their ideas or behaviors based on those of someone they view to have authority or more social standing than they do.

Previous research illustrates that health services and schools are two key types of non-family organizations that may influence contraceptive behavior (Angeles, Guilkey, and Mroz 1998; Caldwell 1982; Entwisle et al. 1997; Freedman and Takeshita 1969; Singh and Casterline 1985). Both can provide actual contraceptives, knowledge about contraceptives, and information about the opportunities one can pursue by using contraception. For instance, increased access to health services or family planning programs that provide contraceptives may lower the costs of contraceptive use. In Chapter 6 I present a more detailed discussion of the link between health services and contraceptive use. Similarly, increased exposure to family planning curricula in schools may also lower the costs of contraceptive use. I present a more detailed discussion of the link between school characteristics and contraceptive use in Chapter 7. These chapters discuss the potential programmatic and social-psychological mechanisms through which health services and schools may influence contraceptive use.

Before I move on to discuss the final piece of the theoretical framework it is important to say that this framework and this dissertation focus on how *exposure* to various dimensions of health services and schools may influence attitudes and behaviors. By exposure I am referring to interactions with children and neighbors who themselves have interactions with the health service or school, interactions with those who work at the health services and schools, and through increased familiarity with the services offered through passive contact such as walking by the building on the way to the market or being exposed to their advertising campaigns (Bongaarts and Watkins 1996; Casterline 2001; Caldwell 1982; Mead [1934] 1967; Zajonc 1968). Of course, understanding how use of or receipt of health services and school enrollment or attainment influence individual behavior is also an important component of understanding the effects of social context. However, considerable evidence already links school enrollment and attainment (Axinn 1993; Blossfeld and Huinink 1991; Caldwell 1982; Thornton, Axinn, and Teachman 1995) and use of health services (Entwisle et a. 1996; Entwisle et al. 1997; Freedman and Takeshita 1969) to contraceptive use. I add to the literature by focusing specifically on exposure effects.

These exposure effects may be particularly strong in a setting where neighborhoods are small and consist of individuals and families who have regular contact with one another and intimate knowledge of each other's lives (Brofenbrenner 1970; Smith-Lovin and McPherson 1993; Valente, Watkins, and Jato 1997). This close living and open display of behaviors such as using medicine or helping children get ready for school allows other individuals to see how these aspects of social context actually influence individuals' lives. The local channels of social interactions are much higher in

such a setting than in one where individuals and families lead isolated lives and have little communication with or knowledge of their neighbors (Bongaarts and Watkins 1996).

Theories of attitudes and behaviors. The final piece of this theoretical framework builds on the idea that attitudes may play an important role in the social context-behavior link to explicitly incorporate this mechanism into the framework. I rely largely on the social-psychological theories of planned behavior and reasoned action (Ajzen 1985, 1991; Ajzen and Madden 1986). According to the theory of planned behavior, there are four factors—attitudes, subjective norms, actual and perceived behavioral control—which affect an individual's intentions and subsequently the individual's behavior (Ajzen 1985, 1991; Ajzen and Madden 1986). Applying this model to contraceptive use we see that one's own attitudes towards contraceptive use and childbearing, one's perceptions of societal beliefs and others' attitudes towards contraceptive use and childbearing, one's ability to use contraception, and one's perception of that ability all influence individuals' actual contraceptive use behavior. Recent theoretical development has expanded the behavioral paradigm from the theory of planned behavior to incorporate individuals' attitudes about those behaviors that may compete with a given behavior (Barber 2001; Plotnick 1992). For instance, with regards to contraceptive use, in addition to the individuals' attitudes, social norms, and behavioral control related to contraceptive use, those about education and employment—activities that a woman may choose instead of having a child—will also influence her contraceptive behavior.

In including attitudes in this framework I also draw on the innovation diffusion theories. I first describe how the relationship between attitudes and contraceptive use is incorporated into the framework and then how the relationship between social context and attitudes is incorporate.

Previous research demonstrates that the spread of many types of new ideas is linked to fertility decline. These include information about contraception and the means of contraception (Knodel 1987), higher consumption aspirations (Freedman 1979), smaller family size preferences (Caldwell 1982), and secular and individualistic attitudes and preferences (Lesthaeghe and Surkyn 1988; Bumpass 1990). By extension, contraceptive use should be influenced by new ideas about contraceptive methods and also by a wider range of attitudes such as those towards family limitation in general and about the roles of family members. A growing body of empirical evidence supports the prediction that attitudes influence behavior (Ajzen 1991; Axinn and Thornton 1992, 1993; Barber 2000, 2001; Clarkberg, Stolzenberg, and Waite 1995; Cleland and Hobcraft 1985; Preston 1986). Most of this evidence focuses on the link between an attitude and a proximal behavior (Barber 2001; Jorgensen and Sonstegard 1984; Reineck, Schmidt, and Ajzen 1996). For instance, ideal family size is related to actual completed family size (Coombs 1974, 1979). Although there have been a few efforts to investigate the relationship between attitudes and more distal behaviors this branch of research is far less developed. Examples of this type of research are the effect of parental beliefs on their children's family formation behavior (Barber 2000; Barber and Axinn 1998) and the effect of attitudes toward women's family roles on childbearing behavior (Plotnick 1992).

The work I present here is unique in that I am able to investigate the relationship between a behavior and both distal and proximal attitudes.

One way aspects of social context are related to the spread of innovative behaviors is by influencing an individual's ability to act on their intentions or new attitudes. Regardless of a person's beliefs or intentions, if they are not in a position to act on them they may not be able to perform the behavior in question (Ajzen 1991). For instance, regardless of their attitudes individuals may not be able to use contraceptives if there are no health services nearby. Social context may also influence social norms and one's perception of those norms. As I discussed above, the spread of new non-family organizations introduces new ideas and behaviors into the community and changes the channels through which individuals learn about others' attitudes and behaviors.

Both social context and attitudes influence how an individual views the costs and benefits of using contraception. I describe this as expanding the costs and benefits in my framework to include both true costs and benefits and an individual's assessment of them (see Figure 2.4). For instance, social, psychological, and financial costs and benefits will depend on how accessible contraceptives are, but also how accessible the individual *thinks* contraceptives are; the individual's own attitudes about contraceptive use or childbearing and what she *thinks* others believe; what actual physical and social consequences or side effects of using a method are and what they *perceive* the side effects to be.

(Figure 2.4, about here)

This explicit incorporation of attitudes is important for the entire framework because it points to a potential mechanism through which social context may influence

individual behavior. The formal and informal interactions with non-family organizations in one's social context lead to changing ideas and attitudes. It is through these interactions that individuals are exposed to new ideas and the more interactions that occur the faster these new attitudes may spread.

Tying together all three components of my framework we see that two ways social context may influence behavior is 1) through influencing attitudes and 2) by influencing the spread of those attitudes. Of course, there are other ways social context may influence individual behavior. For instance, health services may decrease mortality resulting in an increase in contraceptive use without any attitudes changing. Also, as more children attend school the costs of childbearing increases yielding an increase in contraceptive use, again without any attitudes changing. The purpose of this discussion is not to discount these other pathways of influence, but rather to highlight the potential role attitudes may play.

Attitudes change in response to the new ideas that are brought into a community and health services and schools are examples of the types of non-family organizations that may introduce these new ideas. Both the content of the services they offer—medical and contraceptive care or family planning curriculum—and the people who work at the organizations—health workers or female teachers—contribute to this. Health services and schools also serve to increase the channels of social interactions—the opportunities for individuals to learn and be influenced by one another and the mass media (Bongaarts and Watkins 1996; Casterline 2001). As described in the modes of social organization framework, when these non-family organizations are built in a community, individuals have more interactions with people outside their family who hold these new attitudes or

exhibit new behaviors. Additionally, many of the health services and schools in Nepal promote official government programs, policies, or curricula thereby increasing what Bongaarts and Watkins (1996) call national channels of social interactions. In a similar vein, international non-government organizations (INGOs) also contribute to the building of health services and schools, increasing the international channels of social interactions (Bongaarts and Watkins 1996; Freedman 1979).

Thus, I expand the outcome of interest to include any contraceptive use, not just contraceptive use to end childbearing, because many of the attitudes this framework identifies are relevant to the use of any method. Attitudes regarding side effects, effectiveness, or availability of contraceptives are one clear example of attitudes that may influence the adoption of any contraceptive method, not just those to terminate childbearing. Also, attitudes about religion, morality, and familial duties and decision making may influence the use of any type of method. Women who have strong religious objections to contraceptive methods will be less likely to use any method, and when women have little autonomy within their households they are also probably less likely to use any method, not simply those methods that terminate childbearing (Mason 1987, 2001). I present a more detailed discussion of the relationship between specific attitudes and contraceptive use in Chapters 5, 6, and 7.

As a final step in creating this framework I reorganize the heuristic diagram to stress two key points. First, whether referred to as preferences, intentions, motivations, or individualism, attitudes play an important role in influencing behavior. Second, the reality of one's environment—the costs of contraception, behavioral control, social norms, and the interactions with non family organizations—also plays an important,

influential role in individual's decision making. The resulting framework, displayed in Figure 2.1, has three relationship pathways. Pathway "1. True costs and benefits" shows the direct relationship between health services and schools and contraceptive use independent of attitudes. Together, pathway "2. Social interactions" and pathway "3. Assessment of costs and benefits" illustrate that attitudes are one mechanism through which health services and schools influence contraceptive use—where pathway 2 depicts the relationship between social context and attitudes and pathway 3 the relationship between attitudes and contraceptive use. The analyses presented in this dissertation are based on this diagram. I investigate the relationship between attitudes and contraceptive use; health services, attitudes, and contraceptive use; and schools, attitudes, and contraceptive use and organize the analyses into three components: the relationship between attitudes and contraceptive use, between social context and attitudes, and between social context and contraceptive use.

Figure 2.1. Heuristic Diagram of Theoretical Framework, Final

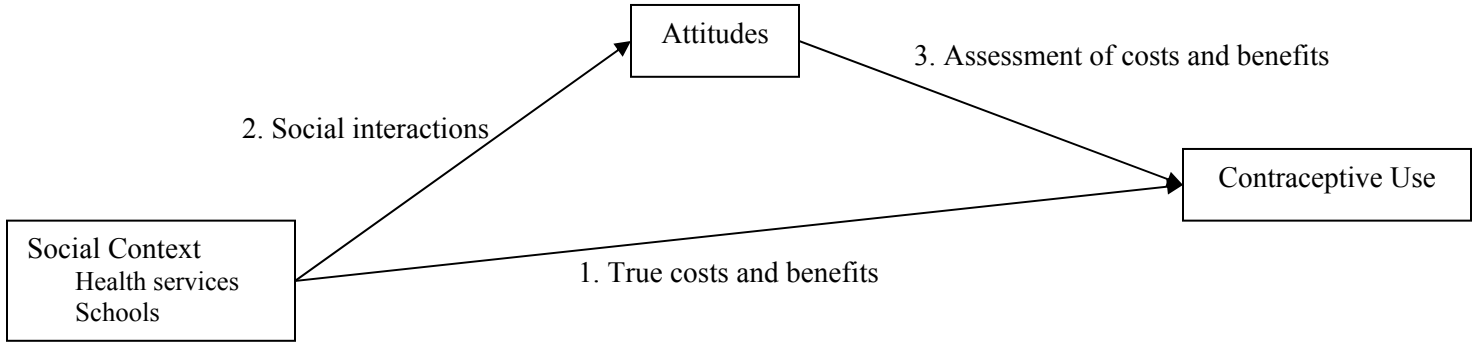


Figure 2.2. Heuristic Diagram of Theoretical Framework, Part A

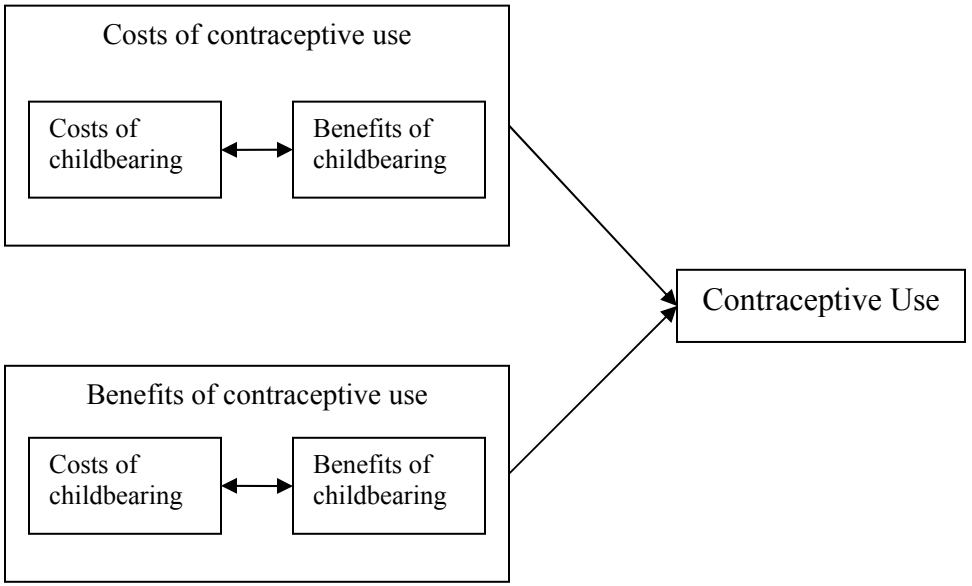


Figure 2.3. Heuristic Diagram of Theoretical Framework, Part B

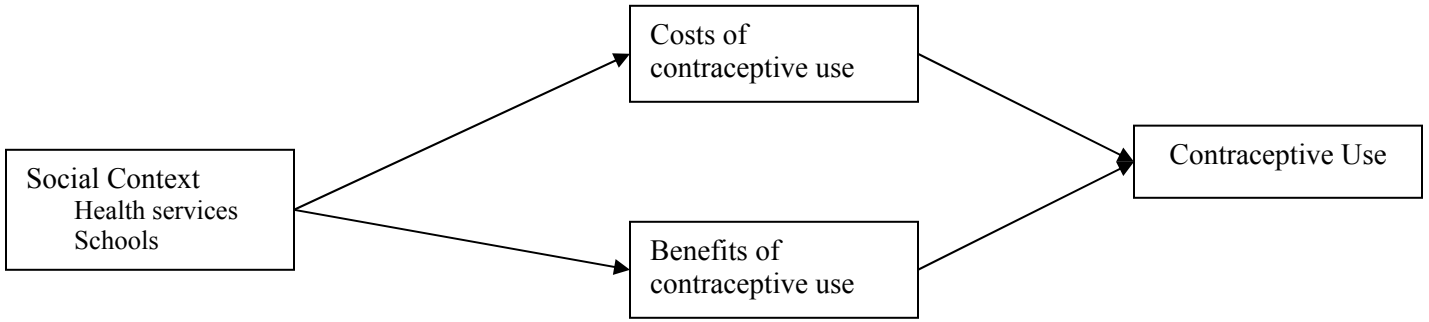
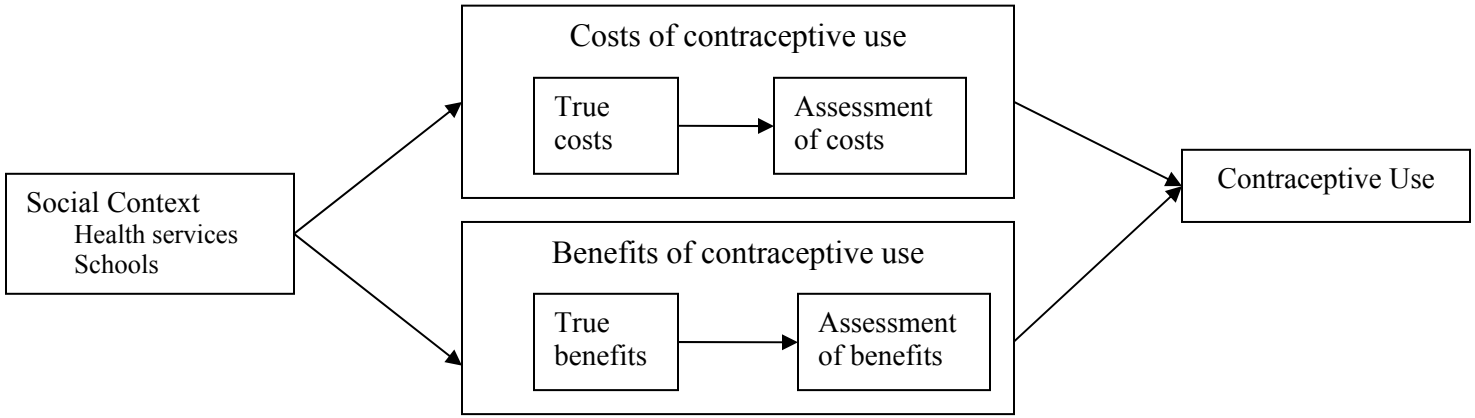


Figure 2.4. Heuristic Diagram of Theoretical Framework, Part C



CHAPTER 3

SETTING

In this chapter I describe the setting for this dissertation—Chitwan, Nepal. I begin with a discussion of the physical characteristics of Nepal and of Chitwan specifically. I then describe how the availability of health service providers and schools has changed over time, paying particular attention to how the specific services or characteristics have also changed. After this, I describe the population. In this section I focus on how contraceptive use and attitudes have changed over time among the individuals currently living in Chitwan. I conclude with a brief discussion of potential policy implications from using Chitwan as the setting for this research.

The setting for this dissertation is the western Chitwan Valley in Nepal (see Figure 3.1). Nepal is a small, land locked country, roughly 54,000 square miles, sandwiched between the northeastern plains of India to the south and the Himalaya mountain range and Tibetan Plateau in China to the north. The landscape of Nepal rapidly transitions from the flat jungle and farmlands of the Terai near the southern Indian border, to the rolling hills of the central region, to the extremely high Himalayan mountain region. Given that Nepal is only about 90 to 140 miles wide this transition is quite dramatic.

(Figure 3.1, about here)

The Chitwan Valley is located in the Terai region, roughly in the center of country. Today, it is a four hour drive along treacherous mountain roads from Kathmandu. Until the 1950s this valley was covered with virgin jungle and thinly inhabited by indigenous ethnic groups (Guneratne 1994). In the 1950s the government began clearing parts of the jungle and implemented malaria eradication efforts. It then instituted a resettlement plan leading to the down migration of many different ethnic groups from the more hilly regions. By the late 1970s roughly two-thirds of this valley was cultivated. A small town, Narayanghat, was growing in one corner, but the vast majority of residents were still employed in agriculture and continued to use old, home-centered methods of production (Axinn and Axinn 1983).

In 1979 the first all-weather road was completed linking Narayanghat to India and eastern Nepalese cities. Following that, two other roads were built—one to the west and one north to the capital city, Kathmandu. Because of Narayanghat's central location, it quickly became the transportation hub for the entire country. This led to the rapid expansion of health services, education, wage labor, markets, and the media (Axinn and Yabiku 2001; Pohkarel and Shivakoti 1986).

Today, Chitwan is known as the Bread Basket of Nepal. It is mostly farmland interspersed with forests and jungle reserves. The study area used for this dissertation is a triangular section of Western Chitwan, about 17km long and surrounded by jungle on one side, one of the largest rivers in Nepal on another side, and the major highway running from India to Kathmandu on the third side. The study area itself is virtually all subsistence farms, although there are a handful of larger endeavors such as chicken farms. Farming, especially transplanting and harvesting rice, is labor-intensive work and

often extended families and groups of women will work the fields together in succession. The long hours walking to the plots and bending at the waist over growing rice plants mean women have ample opportunities to talk amongst themselves.

Homes are clustered in neighborhoods at crossroads made up of groups of 5 to 15 households. This household clustering means that individuals often have to walk far distances to carry out the necessary daily work. To reach firewood, water sources, and grazing lands family members are often required to walk several kilometers, passing different neighborhoods and community services along the way. Schools, health service providers, and other shops and resources also tend to be clustered at crossroads.

Between the time the jungle was cleared and 1995, 116 health services and 145 schools, in addition to many markets, employment opportunities, and other aspects of social context, had been built in Chitwan. Detailed analyses demonstrate that this spread of non-family institutions occurred at different rates for different areas of Chitwan. So, while access has increased for all residents, the degree to which access has increased varies with time and across geographic space (Axinn and Yabiku 2001; Brauner-Otto, Axinn, and Ghimire Forthcoming). Important for the research proposed here, these changes in health services and schools did not occur uniformly throughout the study area—different changes in different dimensions of health services and schools occurred at various times for separate segments of the valley. This allows me to examine these changes across time and space.

Health services. Since Chitwan Valley was opened for settlement, there has been rapid spread of health service providers run by various parties including the government, individual entrepreneurs, and non-government organizations. These providers vary in

their physical infrastructure (hospitals, health posts with a modest laboratory, small pharmacies, homeopathic treatment centers) and in the services they offer (child immunizations, pre and postnatal programs, family planning programs, homeopathic remedies) (Justice 1986; Ministry of Health 1977; UNFPA 1989). Additionally, the specific services offered by these providers has changed over time—both because of the growing number of providers and because the mix of services they offer has changed.

Figure 3.2 shows the increase in the number of health service providers and in the number of providers offering specific services; time increases along the X-axis and number of providers increases along the Y-axis.[4] In 1965 there were only ten health service providers open in the Chitwan Valley. By the end of the study period there were 85. Until 1970 there were no providers offering contraceptive methods, but by the end of the study period over 70 offered them. The increasing slope of these lines indicates that both the number and quality—in terms of services offered—have been increasing dramatically in recent years, although not uniformly across the different services.

(Figure 3.2, about here)

The number of providers offering prenatal services has increased parallel to the number of health-service providers open in the Chitwan Valley. The number offering contraceptive methods began to increase later but quickly caught up. Delivery assistance,

[4] All figures and tables shown in this chapter use data from the Chitwan Valley Family Study (CVFS) described in detail in Chapter 4.

family planning motivation programs, and the number of providers offering child immunizations continue to be rare.[5]

As one would expect, along with this increase in providers and change in services, individuals' use of these services has also increased. Figure 3.3 shows the percent of adults who had visited a health service by age 5, 20, and 35 by birth cohort. All three measures show essentially the same trend: that later birth cohorts are far more likely to have visited a health service provider than younger cohorts, but it is most pronounced when we consider visits before age 20. Just under 30 percent of women born between 1942 and 1951 had visited a health service provider by age 20, but almost 95 percent of women born between 1972 and 1981 had done so. Some of this increase is certainly due to government efforts to increase child vaccinations and this can be seen by looking at the percent of adults whose first visit was before age 5. However, there is still a substantial amount of the increase in visits that occur after age 5 but before age 20.

(Figure 3.3, about here)

Schools. There has been a similar, radical change in schools over this time period. Similar to health service providers, schools were built by community effort, non-governmental organizations, and government programs. Some schools were built by a combination of sources, such as community effort and government programs, whereas

[5] In Nepal, child immunizations—specifically BCG, DPT, OPV, and measles vaccines—are available primarily through the government immunization program, Expanded Program on Immunization, begun in 1977 and run by the Ministry of Health (recently renamed the Ministry of Health and Population). The program was not implemented in all 75 districts until 1989, after which immunizations became more widely available at government health clinics (Nepal South Asia Center 1998). Similarly after 1989, periodic campaigns, sponsored both by the government and non-government organizations, also became more widespread (although they are much more common in remote, hilly regions than in the flat terrai regions where our study site is located). In our study area specifically, all government and non-government immunization campaigns have been physically located at the site of a specific clinic or health service provider. The data we use recorded any health service provider as offering child immunizations that year if a campaign was held at that site or if immunizations are a regular service of that provider.

others by only one. Schools also vary over time and space in terms of their physical infrastructure, their instructional staff, and their curriculum.

Figure 3.4 shows how the number of schools and their characteristics have changed over time in Chitwan, similar to Figure 3.2 for health services. Years is along the x-axis and the number of schools is along the y-axis. Initially, all schools used only the government sponsored curriculum. After about 1980 this dramatically changed and today less than 15 percent of schools rely solely on the government curriculum. The remaining schools supplement this with other subjects or simply modify the government sanctioned subjects to add new material.

(Figure 3.4, about here)

Another interesting change in characteristics over time concerns fee requirements. These fees are typically for extra services such as science or computer labs or libraries and are independent of tuition requirements. Schools with and without tuition requirements charge additional fees. In Chitwan, fees are more indicative of the general quality of the school than tuition requirements. For instance, some schools have nominal tuitions but do not provide an extended curriculum or are unable to pay for trained teachers. In Figure 3.4 we see that the proportion of schools with fee requirements was relatively stable over time, but appears to be increasing in recent years.

Important when investigating the effect of schools on women, counter to the case in other countries neighboring Nepal, virtually all schools have at least one female student. Additionally, the number of schools with female teachers has been rising steadily, with substantial gains made in recent years. However, the quality of teachers has been lagging, with only half of open schools having at least one teacher with a college

education in 1995. Also lagging behind the building of schools is the incorporation of a family planning curriculum.

Individuals' interactions with schools have also increased over time. Figure 3.5 shows how school enrollment and attainment have changed by birth cohort. Here we see that both the percent of individuals who ever attended school (solid bars) and the years that people are enrolled (striped bars) have increased dramatically in the past 60 years.[6] For those born between 1932 and 1941 only about 15 percent attended school and the mean number of years they did so was less than one. However, for the most recent cohort almost 90 percent had already attended school and their mean years of enrollment was almost 9. Since the last year of high school is 10th grade in Nepal this means that many of those who do attend school are staying enrolled long enough to complete primary and secondary education.

(Figure 3.5, about here)

As a result of this variation in the pace of change and the spatial distribution of health service providers, school, and the specific services and characteristics of these providers and schools, different women have access to different combinations of health services and schools over the course of their lives. These varying combinations of access provide me the opportunity to document the independent relationships among specific health services and school characteristics on the one hand and attitudes and contraceptive use on the other.

Population. Officially a Hindu kingdom, Nepal is largely Hindu with the majority of the population of Indo-Aryan descent. There are two important addendums to

[6] Note that the percent ever attended and years of schooling are presented on different y-axes. Also, the mean years of schooling is among all individuals, not just those who attended school.

this statement. First, Hinduism in Nepal, especially as it relates to the caste system, is quite different than in India and other countries. It is a much more liberal version of Hinduism and incorporates many features of Buddhism and the many indigenous religions and cultures prevalent in Nepal before the Hindu domination. Second, although primarily Hindu of Indo-Aryan descent there is a substantial minority of Tibeto-Burmese descent and a number of indigenous groups. Just as Hindus have adopted some of the aspects of other religions, these groups have incorporated pieces of Hinduism into their religious and cultural beliefs and practices. These two factors together yield a complex picture of ethnicity, culture, and religion in Nepal. A full description of this interplay is beyond the scope of this dissertation (see Acharya and Bennett 1981; Bista 1972; Fricke 1986; and Gurung 1980 for more detail). However, it is important to realize that individual behavior and attitudes are couched within the hierarchy and many religious norms and roles created by the Hindu majority. Having said that, there is still considerable variation in terms of contraceptive behavior and related attitudes among the population and variation in how economic and social change influenced the population.

The physical and community changes detailed above were followed by similarly dramatic changes in demographic behavior and related attitudes. For example, the mean age of first marriage rose from approximately 13 for those who married between 1936 and 1945 to approximately 18 for those married in 1966-1975 (Yabiku 2004). The total fertility rate (TFR) had been stable around 6 children per woman for as long as records are available (Banister and Thapa 1981; Tuladhar 1989), but has fallen over the 1990s to a TFR of about 4.6 by 2001 (His Majesty's Government 2001; K.C. 2003; Suwal 2001).

Contraceptive use. Most important for this dissertation is the change in contraceptive use over time. Figure 3.6 shows, by birth cohort, the percent of individuals aged 15-65 who had at least one child and ever used a contraceptive method by 2005 (solid bars) and the mean age of the individual when the first method was used (stripped bars). Looking first at the percent who ever used a contraceptive method (the solid bars) we see that a larger percent of individuals in younger birth cohorts used contraception than in older cohorts. The exception is for the youngest cohort, but this decrease is likely due to age truncation—that is, many of the individuals in this group have just married and started having families and have not been exposed to the same period of risk as the older birth cohorts. Turning to the age when the first contraceptive method was used we see a steady decrease—individuals in younger birth cohorts are generally younger when they first use a method. Some of this effect is also probably due to the fact that the younger birth cohorts by definition cannot have individuals who were older when they first used a method, but given the higher percent of individuals who already used a method it is unlikely that the mean age will increase enough to offset the observed trend.

(Figure 3.6, about here)

Attitudes. A final important piece of this setting concerns attitudes. A key component of the motivation behind this dissertation is a desire to understand the degree to which attitudes are a mechanism for social change to influence individual change. Since I do not have measures of individuals' change in attitudes I cannot definitively speak to how changes in social context change attitudes, but I can document how changes and variation in social context are related to variation in attitudes (see Chapters 6 and 7 for these analyses) and how attitudes have changed over time for the population as a

whole—a task to which I turn now. Of course, the number of attitudes and measures of those attitudes are countless. Here I limit this discussion to a few attitudes the theoretical framework I present in Chapter 2 points to as relevant for contraceptive use decision making.

First, I consider attitudes about contraception and contraceptive use. In Figure 3.7 I show the percent of individuals who agree with specific statements about contraception by birth cohort. As you can see, some measures of attitudes vary considerably across birth cohorts, while others do not. For instance, there is little difference across cohorts regarding the first attitude measure, agreement with the statement "Everyone should use contraception." At least three quarters of all respondents agreed with this statement. However, 45 percent of those in the oldest birth cohort agreed that a vasectomized man cannot be blessed by god (the second attitude), but fewer than 30 percent in the youngest birth cohort agreed—a difference of one third. Even more dramatic, 36 percent of individuals in the oldest cohort agreed that it is sinful to use contraception, but only 8 percent of the youngest cohort did—a two-thirds difference. Other attitudes about contraception also vary across birth cohort. Generally, younger cohorts think that contraceptive methods are both more effective and easier to get (not shown).

(Figure 3.7, about here)

Some attitudes about family also vary by birth cohort. In Figures 3.8 and 3.9 we see that younger cohorts report wanting fewer children (Figure 3.8) and having less of a preference for boys over girls (Figure 3.9). In the first two sections of Figure 3.10 we see that younger cohorts agree less with the statements that a daughter-in-law should be obedient to her mother-in-law or that a man should make most of the household

decisions. I present the last section of Figure 3.10 to again illustrate that not all attitudes vary by cohort—there was little variation across cohorts regarding whether having many children helps parents and surprisingly the youngest cohort has the largest percent who agreed with the statement.

(Figures 3.8-3.10, about here)

Finally, given the dramatic changes in social context, it is likely that individuals' attitudes about non-family activities such as school and work would have also changed. In Figure 3.11 I show the dramatic variation across birth cohorts for attitudes about one's children obtaining a good job or going to college. Across the board, having one's children find a good job is less important than having them go to college, and it is less important for daughters to do either than for sons. However, within each attitude the younger cohorts thought each activity was more important than older cohorts.

(Figure 3.11, about here)

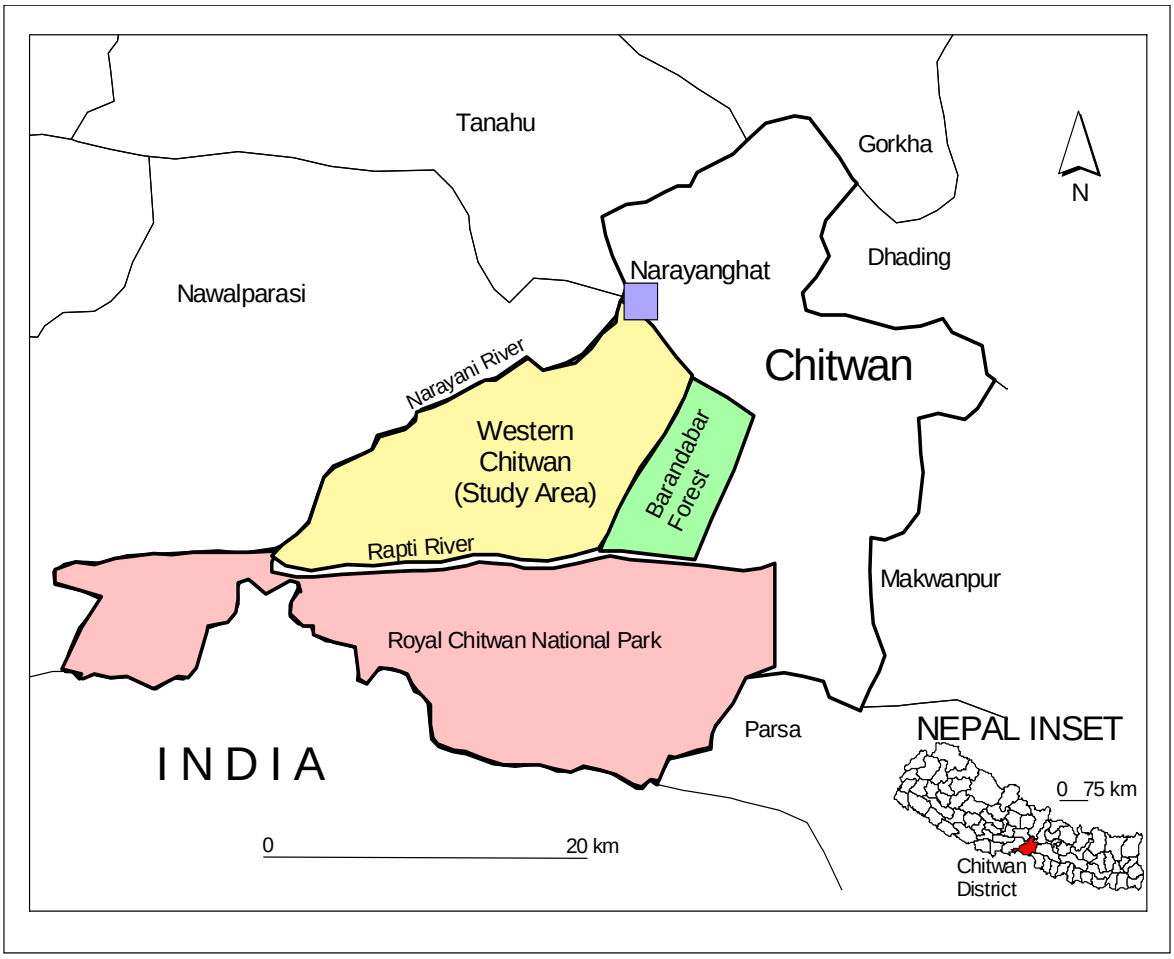
Because of these concurrent and recent changes in health services, schools, and contraceptive use and the variation in behavior and attitudes across cohorts, this setting is ideal for studying the relationship between dimensions of health services and schools on the one hand and attitudes and contraceptive use on the other.

Policy implications. Practically, Nepal is an important place to study because of its similarities to other Asian countries both in terms of its physical or economic conditions and demographics. These similarities mean that the findings from this research may be applicable to these other countries. Like other Asian countries including China, India, Pakistan, Bangladesh, and Indonesia, the majority of Nepal's population are extremely poor and engaged in subsistence agricultural production. Situated between

India and China, Nepal's population is a mixture of the ethno-racial groups originating in these two countries. Consequently, family life in Nepal is similar in many ways to family life in nearby regions of South Asia.

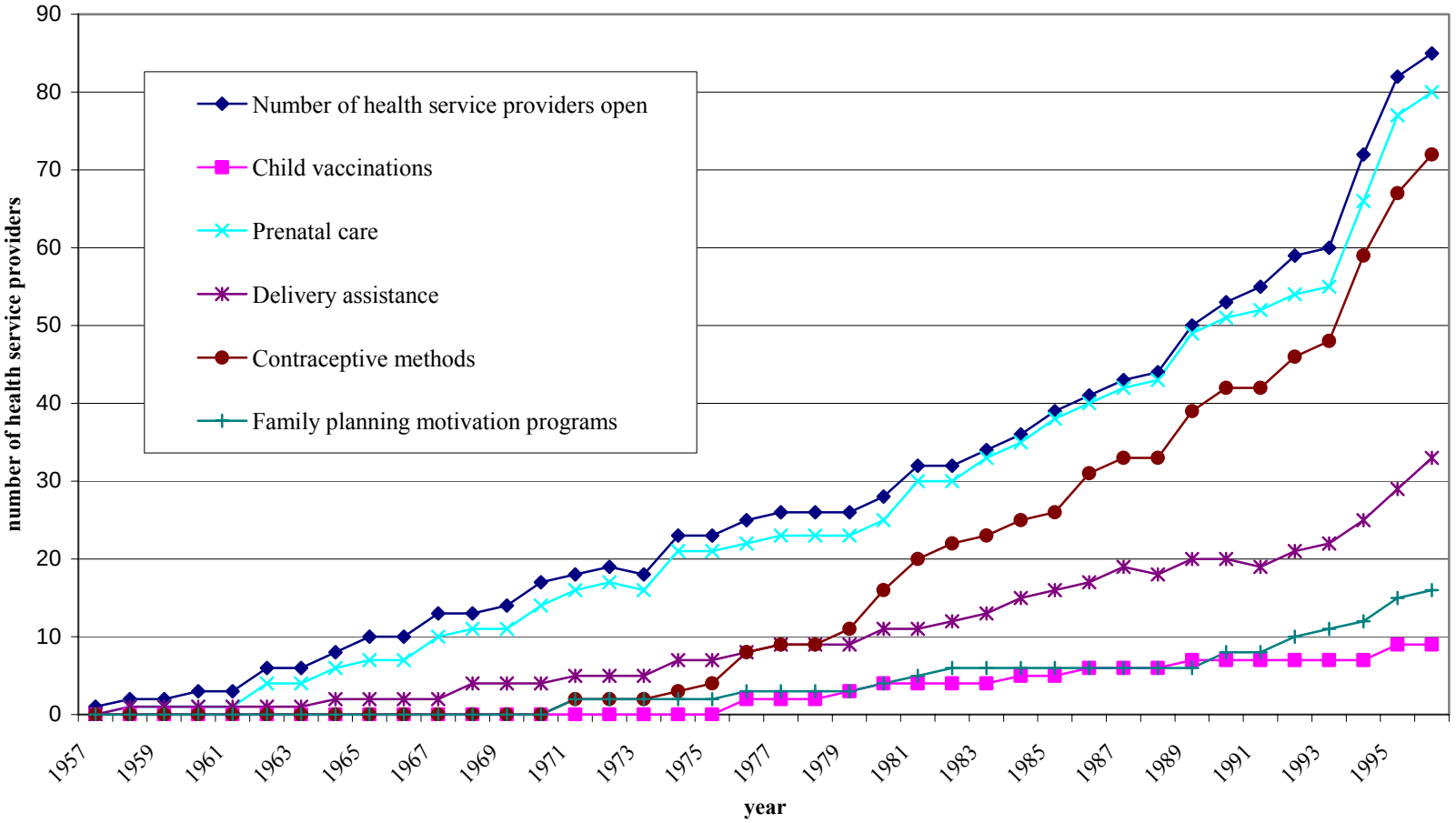
Nepal is also similar to other Asian countries in terms of the pressing policy issues it faces. Many South Asian countries continue to have relatively high fertility rates and low levels of contraceptive use (with the exception of Sri Lanka and parts of Southern India). This is somewhat surprising since South Asian countries have had very long standing antinatalist policies and programs (UNFPA 1989). Addressing this continued high fertility despite widespread family planning programs and antinatalist policies is a priority for most governments and social and economic policy makers in this region. The combination of large populations and high rates of population growth is considered by many to be a major obstacle to improving standards of living in countries like Nepal, Bangladesh, Pakistan, and India (K.C. 1992; UNFPA 1989). Because large families and early childbearing are believed to have negative consequences at the individual level (Furstenberg, Brooks-Gunn, and Morgan 1987; Knodel, Havanon, and Sittitrai 1990; Knodel and Wongsith 1991) in addition to these macro-level consequences, reducing fertility has become a high priority in the region. New information about the precise social and economic factors that encourage fertility decline, and the mechanisms at work may help policy makers formulate new programs that will help bring population growth under control.

Figure 3.1. Map of Nepal and the Chitwan Valley



Source: Yabiku 2002.

Figure 3.2. Description of Change Over Time in Number of Health Service Providers and in Specific Services Offered



(figure appears in Brauner-Otto et al. Forthcoming)

Figure 3.3. Use of Health Services by Birth Cohort

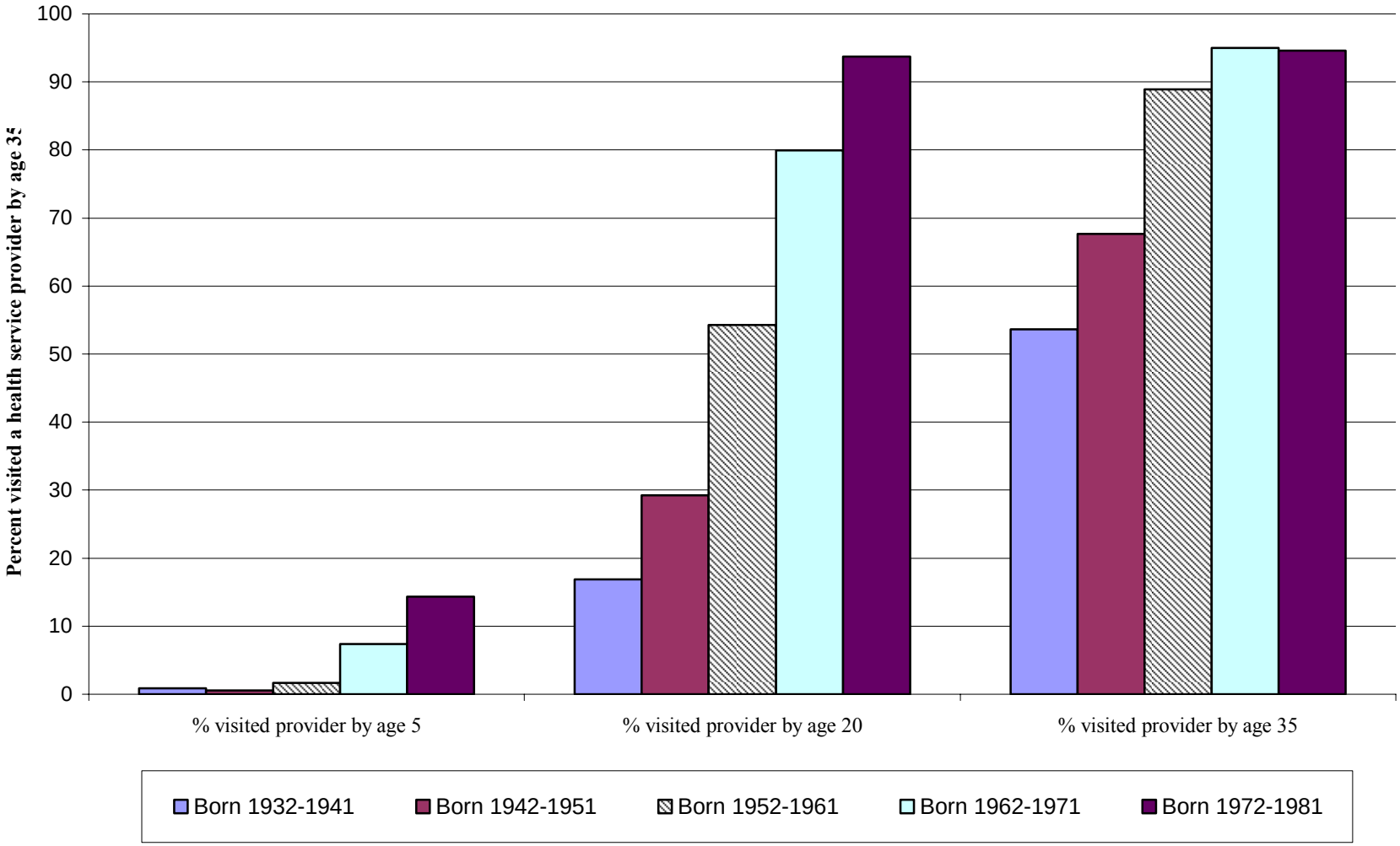


Figure 3.4. Description of Change Over Time in Number of Schools and Their Characteristics

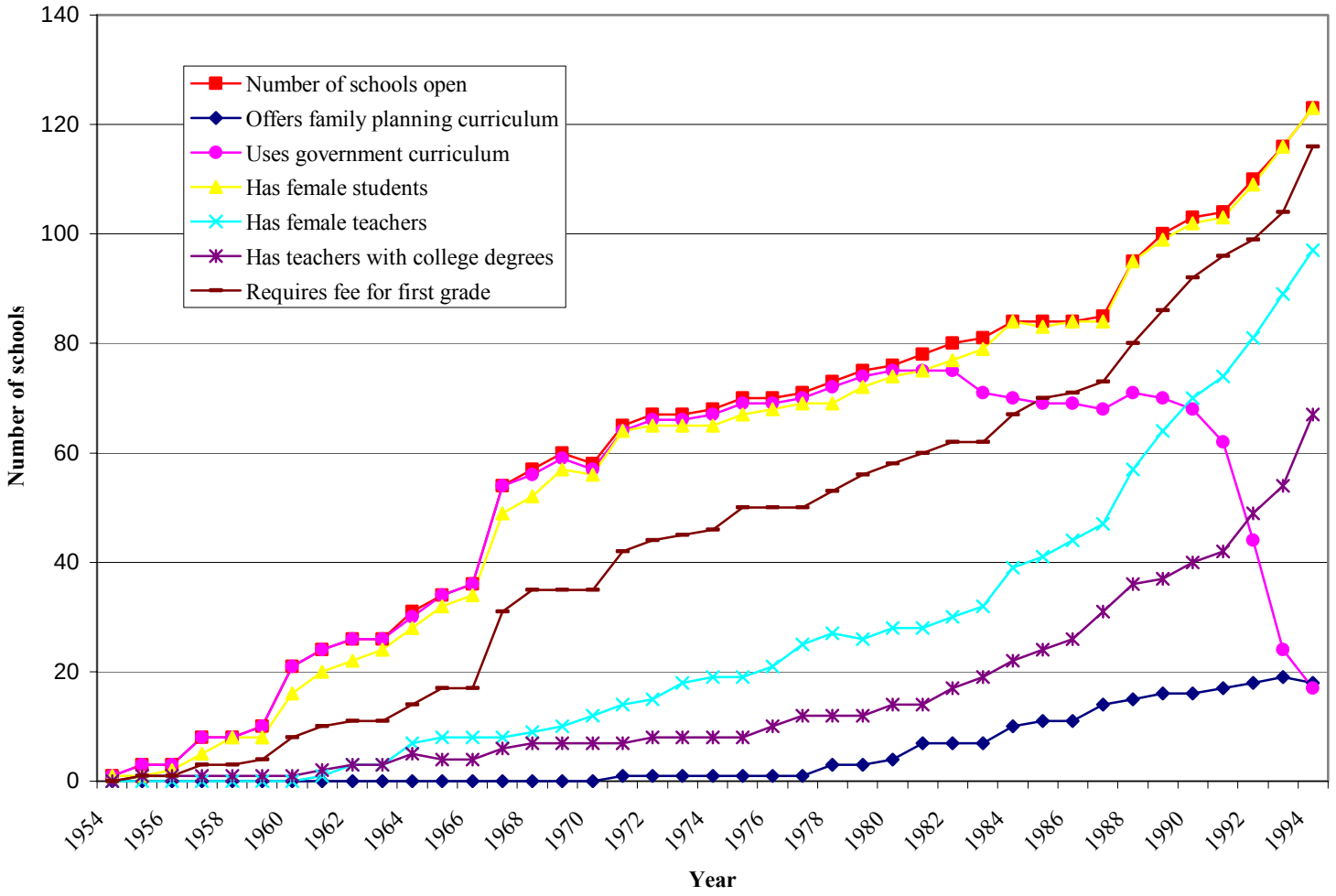


Figure 3.5. Education by Birth Cohort

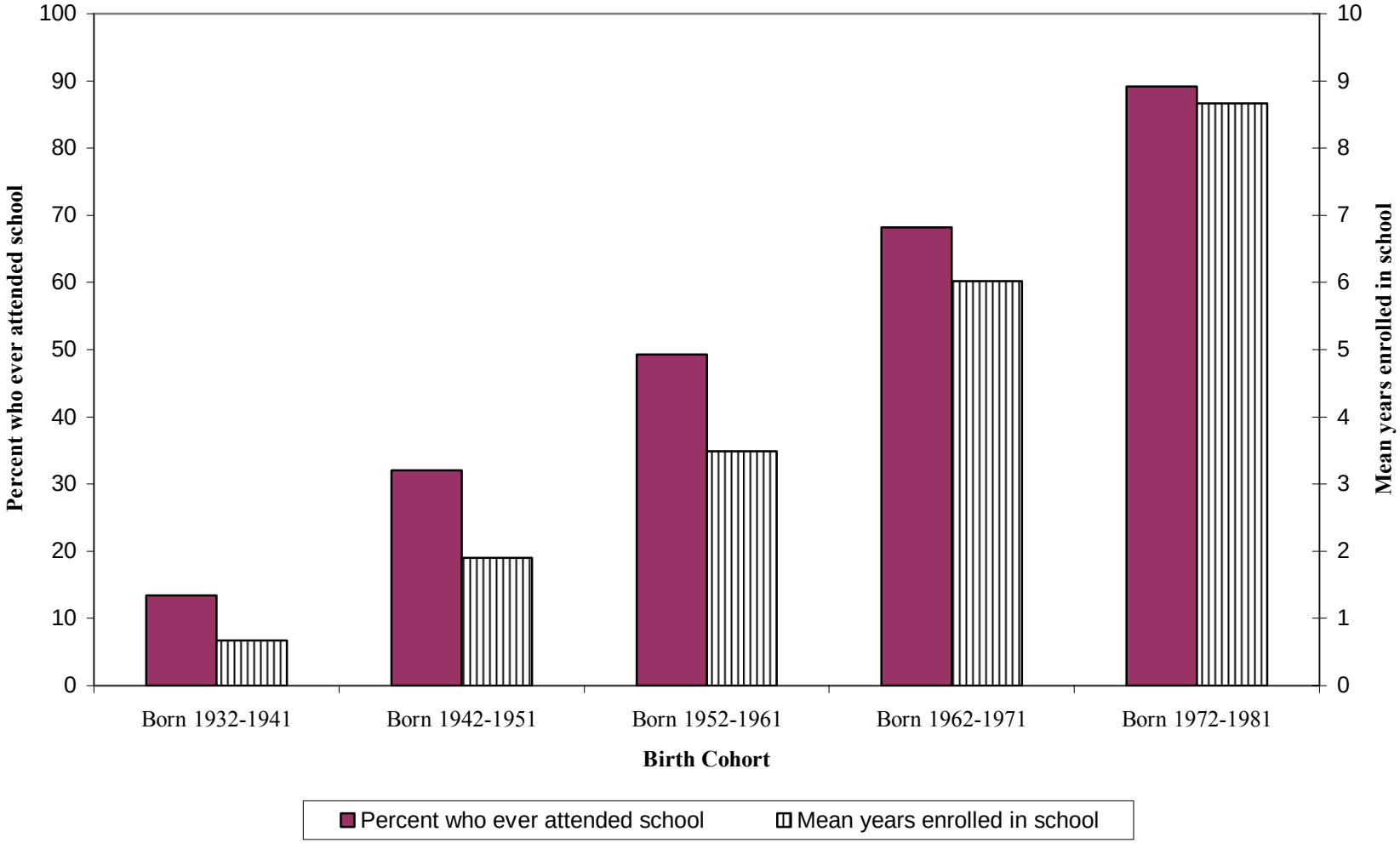


Figure 3.6. Contraceptive Use For Individuals With At Least One Child by Birth Cohort

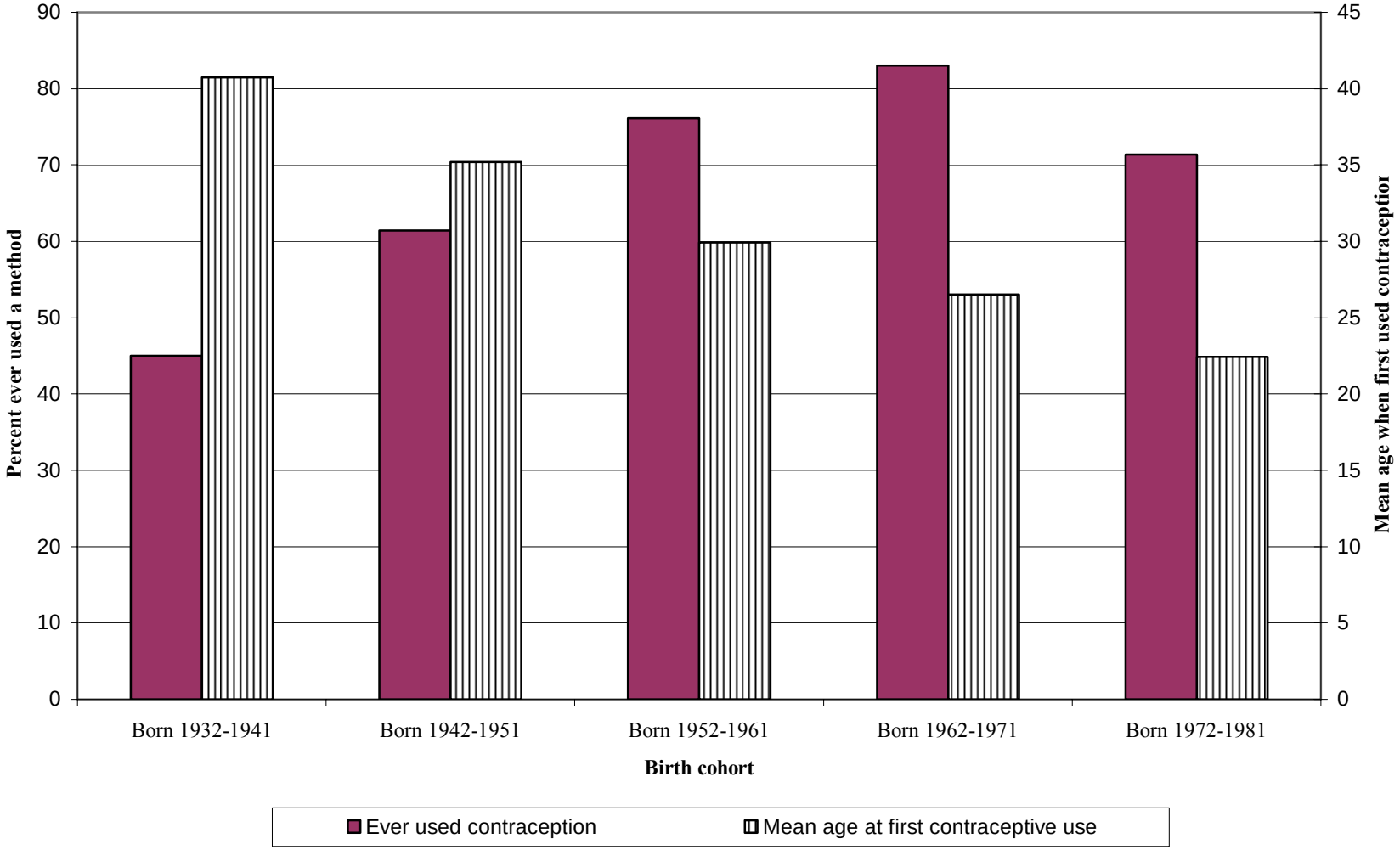


Figure 3.7. Attitudes About Contraceptive Use by Birth Cohort

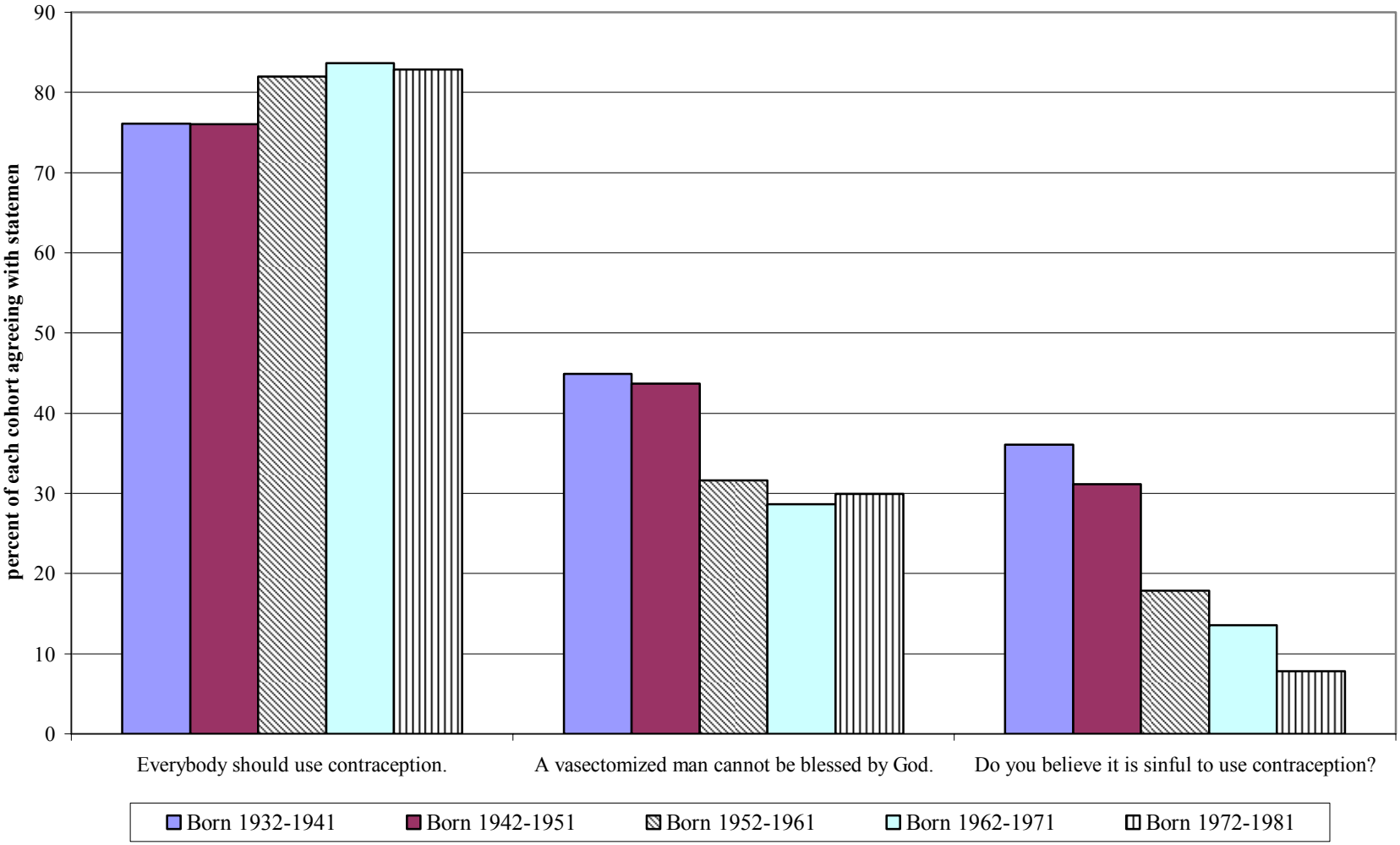


Figure 3.8. Desired Family Size by Birth Cohort

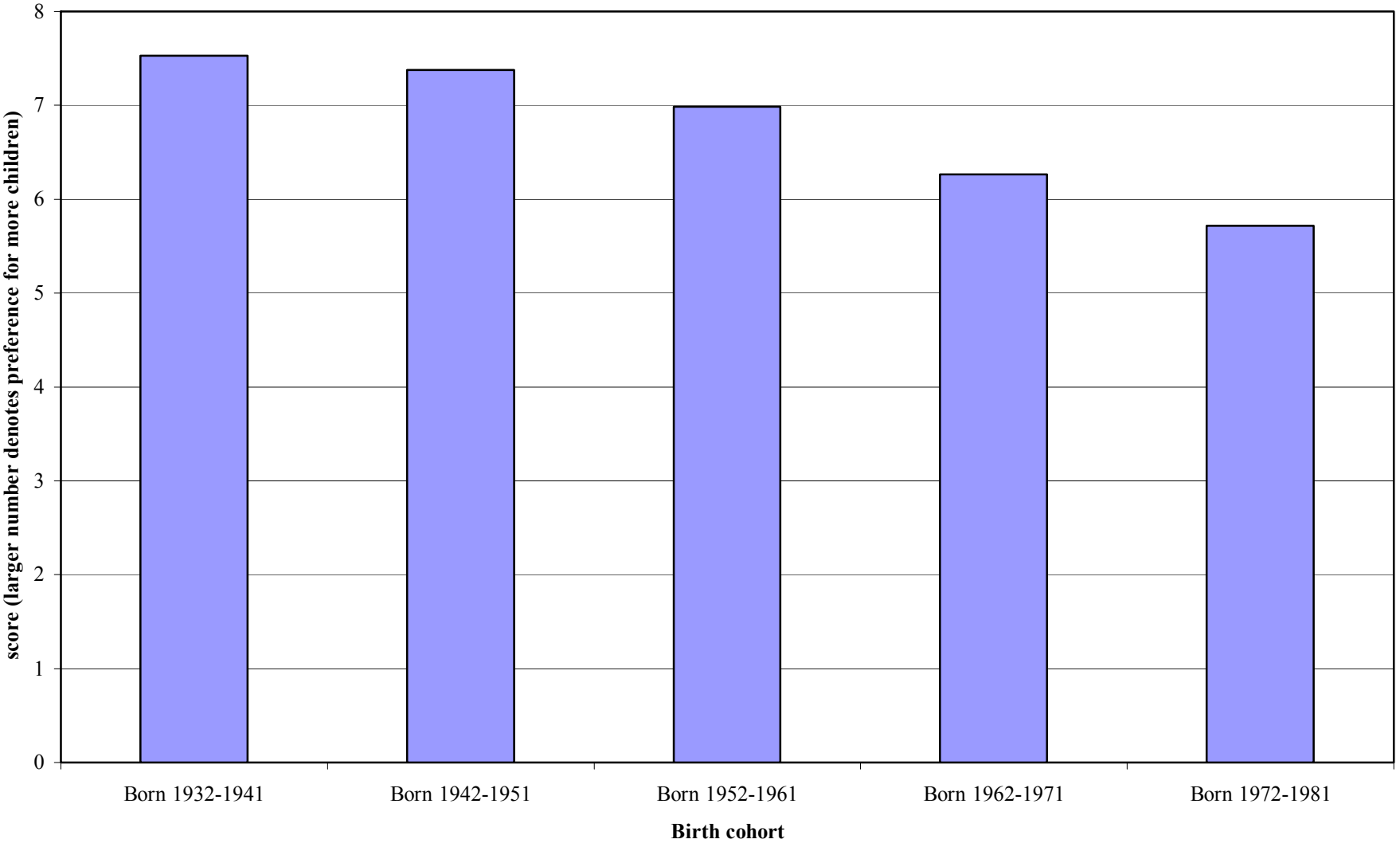


Figure 3.9. Desired Gender Composition of Family by Birth Cohort

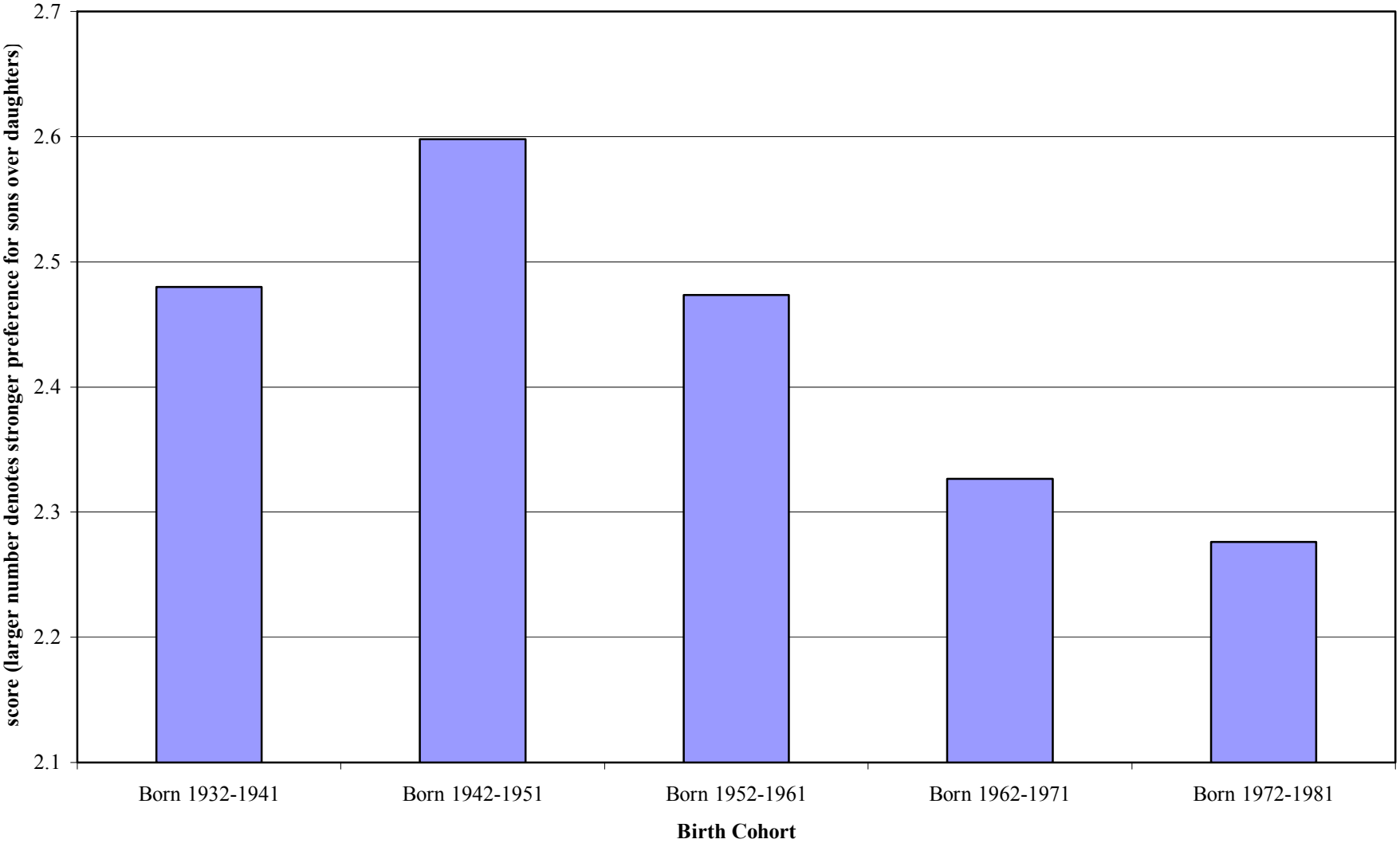


Figure 3.10. Attitudes About the Family by Birth Cohort

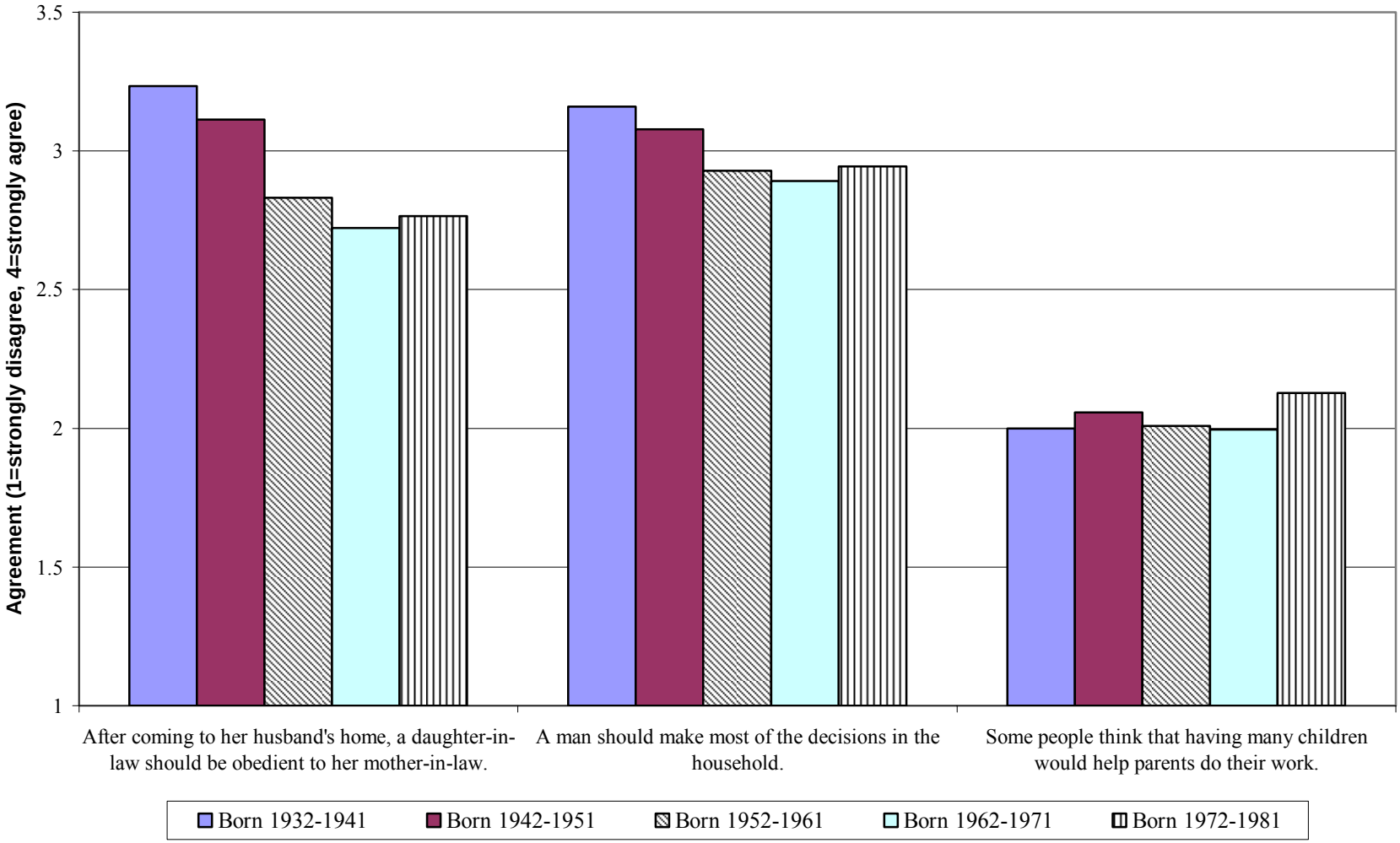
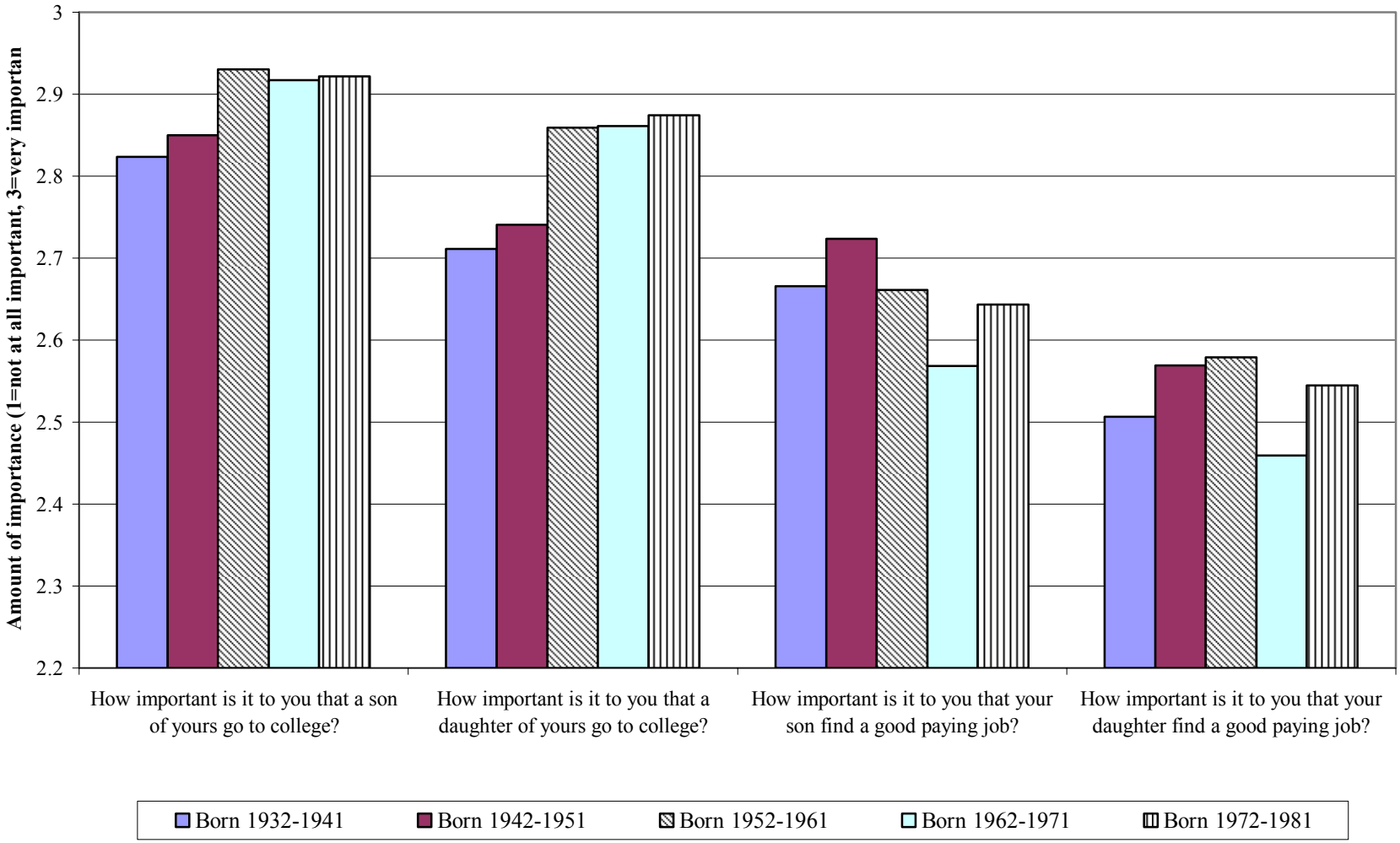


Figure 3.11. Attitudes about Non family Activities by Birth Cohort



CHAPTER 4

DATA AND METHODS

In this chapter, I introduce the data and methods I use in my empirical analyses. I begin with a description of the data set. Following this are three separate sections that describe the empirical models and estimation techniques I use to model the relationship between social context and attitudes, between attitudes and contraceptive use, and between social context and contraceptive use, respectively. I also provide descriptions of the measures of contraceptive use and some of the basic controls I include in my models. Because each set of analyses use different measures of attitudes, social context, control variables I include descriptions of them in their respective analytic chapters (Chapters 5, 6, and 7).

Data

To test my empirical predictions I use data from the Chitwan Valley Family Study (CVFS) conducted in rural Nepal. This study combines survey and ethnographic methods to obtain detailed measures of health services and schools, individuals' attitudes, individuals' life histories, and prospective panel data. As argued in previous chapters, the Chitwan Valley is an ideal setting for this research because the spread of health service providers and schools, changes in the dimensions of these aspects, and changes in childbearing beliefs and behavior occurred within the lifetimes of the valley's current residents. Also, change in the health services and schools in the Chitwan valley is

contained both temporally and geographically making it an ideal setting for evaluating the various aspects of health and educational context discussed above. It is true that residents would have been able to leave the valley to obtain medical or educational services prior to the building of the first health service provider or school in the valley. However, those organizations probably had very weak effects on behavior because they were so far away.

The analyses presented here use data from four separate sources: neighborhood history calendars, individual life history calendars, individual survey interviews, and prospective monthly panel data collection. Immediately below I describe these data sources. Following that I detail the analytic strategy I use in this dissertation.

Neighborhood History Calendars. Information regarding changes in the dimensions of the health service providers and schools, and other important aspects of community context was collected using the Neighborhood History Calendar (NHC) technique (Axinn, Barber and Ghimire 1997). This technique involves combining information gathered from multiple sources, including community records, structured, semi-structured, and un-structured interviews with community members, to arrive at a consensus about the specific aspect of neighborhood context in question. In this rural setting, a neighborhood defines clusters of approximately 5 to 15 households—a group of individuals who have face-to-face contact on a daily basis. Using stratified, systematic sampling 171 neighborhoods were selected for the CVFS study. Then, using the NHC technique, the distance and time of travel to the closest health service provider, school, employer, market, bust stop, dairy, temple, and police station for each neighborhood for

each year from 1945 to 1995 was collected. Before 1945 this area was completely covered in forest and there were no community services available.

The NHC technique was also used to collect Health Service History Calendars on all 116 health service providers and School History Calendars on all 145 schools ever operating in the study area from 1945-1995. The same mixed methods approach was used to create a list of every health service and school that ever existed in Chitwan, including those which were no longer open at the time of data collection. Location and dates of operation, recorded on an annual basis, were collected for all health service providers and schools. Health Service History Calendars also included information on the cost and availability of specific family planning, maternal and child health services offered, the number of days per week and hours per day open, number and type of staff, and characteristics about the physical structure of the provider. School History Calendars included information on curriculum, number and gender of students and teachers, teachers' education, highest and lowest grades available, number of classrooms, tuition and fees first and tenth grades, number and gender of boarding students, and the language of instruction (English or Nepali).

Individual Life History Calendars. Life History Calendar techniques were used to collect reliable information regarding residents' contraceptive behavior, marital and childbearing behavior, education, and labor force participation (Axinn, Pearce, and Ghimire 1999). All residents in selected neighborhoods aged 15-59 and their spouses were selected as respondents and interviewed in 1996. The overall response rate of 97 percent yielded 5,271 completed interviews (this includes the survey data collection discussed below). All interviews were conducted in the most common language in Nepal,

Nepali (questions presented throughout this dissertation are translated into English). The Life History Calendars used in this study were altered to be appropriate and relevant to the rural population being studied. For a more complete description of this technique see (Axinn, Pearce, and Ghimire 1999).

Survey data collection. A questionnaire accompanied the LHC. This survey interview covered topics such as childhood community context, non-family experiences, religion and religiosity, marital and family networks, and social networks. The survey also collected information on childbearing and other family related attitudes and attitudes about contraceptives. The attitude measures include Coombs scale measures of preference for completed family size and the gender of children, opinions regarding education and non-family employment versus childbearing, ideal age at marriage, attitudes towards remaining single, remaining childless, large families, divorce, remarriage, intermarriage, the gendered division of labor, premarital sex, contraceptive use, old age care, and expected support from children. Questions related to contraceptives include those asking about religious or moral objections to contraceptives and perceptions of costs, side effects, and efficacy of specific methods.

Data collection for almost all the individual surveys and Life History Calendars occurred over a 6 month period from July to December 1996. For a small proportion of the sample, less than 5 percent, these interviews were not in fact completed until April 1997. These later interviews were with individuals who had not been living in Chitwan at the time of data collection.

Prospective monthly panel data collection. Following the 1996 individual interviews the CVFS began collecting monthly data on pregnancies, births, deaths,

marriages, contraceptive use, and changes in living arrangements for all the individuals in the selected households. Each month respondents were asked whether they were using each of eight contraceptive methods and whether he/she or his/her husband had been sterilized that month. The eight contraceptive methods are: Depo-Provera, Intra uterine devices (IUDs), Norplant, oral contraceptive pills, condoms, spermicidal foam, abstinence, or any other method. Once a respondent reports that she has been sterilized she is no longer asked about using contraceptive methods.

Only 151 of the original 171 neighborhoods were selected for this data collection component yielding 4,632 individuals, ages 13-80. Interviewers visit each household monthly and every household member over age 18 is interviewed separately about his/her contraceptive use. Also, households that move out of the study area are tracked and interviewed—95 percent of respondents have been interviewed for these data. Information on these households has been collected now for 108 months.

The prospective monthly data collection began in February 1997. During this first month interviewers recorded information that occurred between the end of the individual interview and February 1997 . For respondents who completed their individual interview in July 1996 this first month included any contraceptive use during the entire six month period. However, for respondents who completed their individual interviews later than this, this period is shorter. Starting in March 1997 all data collection periods were one month intervals.

This irregular initial period at the beginning of the prospective data collection raises some methodological issues with regards to the hazard models I describe below. Specifically, the first “month” of data for the prospective data collection is not the same

length of time for everyone nor is it the same length of time as subsequent months of data. As a result, I treat information for this month separately from the later months of data. I describe my specific methodological approach in each analytic chapter.

Analytic Strategy

My analyses have one overarching goal—identification of potential mechanism through which variation in specific dimensions of health services and schools is related to variations in childbearing behavior. This translates into three main analytic components, with the last component consisting of two parts: 1) analysis of the effect of variation in dimensions of health services and schools on variation in childbearing and other family related attitudes; 2) analysis of the effect of variation in childbearing and other family related attitudes on variation in contraceptive behavior; and 3a) estimating the total effects of variation in dimensions of health services and schools on variation in contraceptive behavior and 3b) estimating the indirect effects of variation in dimensions of health services and schools on variation in contraceptive behavior via attitudes. In Chapter 5 I model the relationship between a wide range of attitudes and contraceptive use, component 2 above and pathway 2 in Figure 2.1. In Chapters 6 and 7 I model all of the pathways described above, components 1, 2, 3a, and 3b above and pathways 1, 2, and 3 in Figure 2.1, focusing on the health service context in chapter 6 and the school context in chapter 7. These separate analytic components require different methods and analysis samples that I describe below.

For chapters 6 and 7 I approach my analysis from both a life-course perspective and a social organization of the family perspective. I start with models of attitudes as outcomes because these attitudes will be used to predict later life events, namely

contraceptive use. Next, I model the relationship between individual attitudes and contraceptive use. Then I reintroduce the measures of social context and model the relationship between dimensions of health services and schools and contraceptive use. These last models build directly on the previous sets so I will use a nested-model strategy across pathways to estimate total effects and then to partial those total effects into indirect and direct effects. This follows the analytic strategy outlined by Entwisle, Casterline, and Sayed (1989). For example, for my final component, estimating the direct effect of dimensions of health services and schools on behaviors, this strategy involves first estimating a simple model including only measures of dimensions of health services and schools and control variables. Next, I will estimate a slightly more complicated model including everything in the simple model plus measures of attitudes. Thus, the first model is nested within the second model. Other researchers using these same data have successfully used this strategy (Axinn and Barber 2001; Axinn and Yabiku 2001). Using this approach here allows me to do two important things. First, I can assess the extent to which beliefs add to the overall fit of the model. Second, I can observe changes in the estimated effects of dimensions of health services and schools between the two models, and can attribute those changes to the additional attitude variables in the model.

A brief note about this final set of models with measures of social context, attitudes, and contraceptive use. I am not able to determine when a specific attitude was formed, only what it was at the time of the interview in 1996. Consequently, I am not able to empirically determine whether attitudes are an intervening mechanism through which dimensions of health and education context influence behavior, or whether dimensions of health services and schools are the intervening mechanism through which

attitudes influence behavior. However, my theoretical framework guides me to believe that attitudes are the intervening mechanism. In my models I use the temporal ordering embedded in my multilevel event history and prospective panel data to more correctly specify my models. This will be discussed below and in subsequent chapters in more detail when I describe the specific measures I use.

Analysis Sample

For all my analyses I start with use one basic analysis sample: 1,262 women who were aged 15 to 44 in 1996, had not been sterilized by the start of the hazard, and married at some point in the data collection period.[7] Of these women, 70 percent were married by 1996 and the remaining 30 percent marry during the prospective data collection (1997-2006). Note, there were 98 women aged 15-44 in 1996 and not yet sterilized who do not marry in the prospective data and therefore are not included in any of these analyses.[8] The analysis samples actually used in the following chapters vary slightly from this sample of 1,262 women depending on missing data on other variables included in those analyses. I describe the specific samples in each chapter.

I restrict the sample to these younger, non-sterilized women because women beyond childbearing age or who have been surgically sterilized are not at risk for using contraception to avoid pregnancy. Although sexually transmitted diseases and infections are becoming more prevalent in Nepal, and condom use to prevent their transmission is of obvious social importance, the research presented here is concerned with contraceptive

[7] This number accounts for 20 women who are deleted from the sample because of missing data on one or more of the parental background measures described below and used as controls in all the models.
[8] Also note that 2 women who satisfy the age, marriage, and sterilization criteria were married in the last month of the prospective data collection and therefore do not have any period of risk to contribute to these analyses and 7 women used contraceptives either in the same month they were married or in the month prior to marriage and are also not included in this base analysis sample.

use as it relates to pregnancy prevention so I only examine women at risk of pregnancy occurring. I consider women to be at risk of using a contraceptive method only after they are married because, in this setting, premarital sex is extremely rare. As a result, I limit my sample to women who marry at some point in the data. Because I use event history methods to model contraceptive use (described below) I am able to include women who were not married at 1996, but do so during the prospective data collection period. This will become clearer when I describe the specific models and estimation strategies I employ.

Health Services, Schools, and Attitudes

The first group of analyses I propose is the estimation of the total effects of variation in dimensions of health and educational context on variation in attitudes. These analyses treat the attitudes as dependent variables and dimensions of health services and schools as independent variables. In these analyses the dependent variables come from the individual survey data and the key independent variables come from the health service and school history calendar data. The specific variables are described in detail in the appropriate analytic chapters.

Total Effects of Dimensions of Health Services and Schools on Attitudes. My analysis of the relationship between variation in dimensions of health services and schools and attitudes follows the equation:

$$A_{in} = \beta_0 + \boldsymbol{\beta}_1 \mathbf{T}_{in} + \boldsymbol{\beta}_{2n} \mathbf{S}^{d}_{nt} \qquad \text{(equation 4.1)}$$

and

$$\boldsymbol{\beta}_{2n} = \beta_2 + \mu_{2n} \qquad \text{(equation 4.2)}$$

where A_{in} is a specific attitude for individual i in neighborhood n, β_0 is the intercept, $\boldsymbol{\beta}_1$ is a vector of coefficients.[9] $\mathbf{T}_{in}$ represents a vector of individual characteristics that may influence both exposure to the dimensions of health services and schools and individuals' attitudes. Previous research has found that parental characteristics are important predictors of both attitudes and behavior (Axinn and Thornton 1992, 1993; Axinn and Yabiku 2001; Barber 2000, 2001; Barber and Axinn 1998; Thornton and Camburn 1987). Consequently, I use dichotomous measures to control for father's and mother's education (ever went to school), father's employment (ever had non-family employment before respondent's age 12), and parents ever used a contraceptive. I also include a count measure of the respondent's mother's children ever born. Descriptive statistics for these, and all the control measures described in this chapter are presented in Table 4.1.

(Table 4.1, about here)

Additionally, because ethnicity in Nepal is complex and likely related to individual's attitudes and behaviors, I use dichotomous variables to control for five classifications of ethnicity: high-caste Hindu, low-caste Hindu, Newar, hill Tibeto-Burmese, and terai Tibeto-Burmese. High-caste Hindu is the reference group in our analyses. A full description of the ethnic groups in this setting is beyond the scope of this project (see Acharya and Bennett 1981; Bista 1972; Fricke 1986; and Gurung 1980 for detailed descriptions).

I also control for birth cohort. I create dichotomous variables for four birth cohorts: 1981-1977 (ages 15-19 at the 1996 survey), 1976-1972 (ages 20-24 at the

[9] I follow the convention of writing vectors of variables or coefficients in **bold** type; single variables and coefficients are in regular type.

survey), 1971-1967 (ages 25-29 at the survey), and 1966-1952 (ages 30-44 at the survey). The 1981-77 birth cohort is the reference group for all the analyses.

$\boldsymbol{\beta}_{2n}$ is the intercept for neighborhood n. In all the models presented in this dissertation it is a neighborhood level random coefficient. β_2 is the mean, or intercept, for all neighborhoods and μ_{2n} is the standard deviation, or random part, for each neighborhood.

$\mathbf{S}^{d}_{nt}$ is a vector of dimensions of health services and schools and neighborhood level control variables for neighborhood n at time t. For health services the measures of dimensions include the specific services offered—family planning, child, and maternal health services. The measures of dimensions of schools include measures of the type of curriculum taught (family planning curriculum), characteristics of the teachers (their gender and education), characteristics of the student body, and the cost of attending school. These measures are described in detail in their respective analytic chapters.

As mentioned previously, the distribution of health services and schools and their dimensions has changed over time and varies across space. Some evidence clearly points towards the physical proximity of health services and schools as a key determinant of fertility behavior (Buor 2002, 2003; Entwisle et al. 1997). Nevertheless, research on these topics has not arrived at any accepted standard for the measurement of the spatial distributions of these services.

Most previous research on community effects investigates the effect of the community feature closest to the respondent. However, consideration of only the nearest health service or school may not provide adequate conceptualization—the nearest one is not necessarily the only one that is easily accessible (Brauner-Otto et al. Forthcoming;

Downey 2006). For example, the closest health service may be a quarter of a mile away, but there may be another health service a third of a mile away and still another within a half mile—all easily accessible with information about the services offered at all three locations easily spread within the community. Even more problematic in terms of data analysis, there may be multiple health service providers at the same distance, but in different directions. How is a researcher to know which health service to consider as influential?

Limiting analysis to only the nearest building may not fully capture the individual's true health service or school context. Instead, consideration of the entire mix of services offered within a reasonable distance may be more appropriate. Certainly, characteristics of the specific setting such as the transportation infrastructure will condition this distance, but even then it is difficult, if not impossible, to determine how far away a health service or school is before it has no influence on an individual. In reality, it is likely that the realm of influence for health service providers and schools does not have a fixed boundary. Previous research provides evidence that the effect of stationary features of social context, like health service providers and schools, has a continuous distribution, much like distance itself, with services in closer proximity having greater influence on the individuals than those farther away (Brauner-Otto et al. Forthcoming; Downey 2006).

Following the bulk of previous literature, the first set of measures of health services and schools I examine refer to the health service provider or school located closest to the respondent's neighborhood. The second set of measures address the fact that multiple organizations may simultaneously influence behavior and incorporate all of

the providers or schools in the study area. Because these measures of dimensions of health services and schools were collected from each neighborhood's perspective, without placing boundaries on which services were relevant, and because the contextual measurement includes a census of every organization or service that has existed within the study area, not just those services named by neighborhood members I am able to create complex, geographic specifications for each dimension of health services and schools which are described in detail in later chapters.

Keeping in mind that the overarching goal of this research is to help identify the mechanisms through which health services and schools influences individual behavior, the findings from these analyses relate to my main aims in two ways. First, these results provide evidence regarding the extent to which health services and schools influence attitudes. If health services and schools do not significantly influence attitudes then it is not possible for the attitudes to be a mechanism through which health services and schools influences behavior. Consequently, for the analyses described below where I test attitudes as an intervening mechanisms through which social context influences behavior I will only be testing those attitudes that were found to be significantly influenced by social context. Second, assuming health services and schools do influence attitudes, analysis of the dimensions of health services and schools will provide evidence regarding which mechanism, or pathways, this influence occurs through.

Estimation Techniques for Models of Attitudes. Because the individuals in the CVFS are clustered with several individuals living in the same community who all have the same community characteristics, I estimate multilevel models to account for this data structure. The similarity between individuals in the same neighborhood may result in

elevated Type 1 error rates, biased estimators of the regression coefficients, and suffer from duration bias (Barber et al. 2000; Mason et al. 1983). Most importantly, if one wants to compare individuals with different experiences within the same or similar communities, then regression coefficients in a single-level analysis applied to data on individuals grouped within communities are not the desired regression coefficients. Rather, regression coefficients from the single-level hazard reflect comparisons of individuals averaged over the variety of communities. Techniques for multilevel modeling are well developed and have been widely applied in fertility research (Entwisle, Casterline, and Sayed 1989; Entwisle and Mason 1985; Hirschman and Guest 1990; Mason et al. 1983; Raudenbush and Bryk 2002). For interval type variables I use *PROC MIXED* for OLS regressions and the *GLIMMIX* macro for SAS for logistic regressions to properly specify the multilevel nature of the data.

Attitudes and Contraceptive Behavior

My analyses of the effect of attitudes on contraceptive behavior use data from the individual-level survey data collection, the prospective monthly data collection, and the life and neighborhood history calendars. The dependent variables are created from the prospective data, the attitude variables are created from the individual-level survey data, and the control variables from the survey data, life history calendars, and neighborhood history calendars. Before I describe the specific measures and methods I employ I provide some background information on contraceptive use among the women in my analysis sample.

Contraceptive Use. Table 4.2 presents descriptive statistics regarding women's first contraceptive use.[10] Fifty-eight percent of women in this sample used contraceptives at some point during the prospective data collection period (Table 4.2). I consider the eight methods listed in Table 4.2 in creating my measures of contraceptive use. I include using a spermicidal foam in the other category and I do not consider abstinence as a contraceptive method.

(Table 4.2, about here)

As you can see in Table 4.2, although a variety of contraceptive methods has been available in Nepal for the past 20 years, Nepalese, like other South Asian populations prefer longer term methods such as sterilization and Depo-Provera. Depo-Provera is by far the most popular choice for first method use with 45 percent of women using this method. Sterilization, especially husband's sterilization, is the second most common first method with 22 percent of women who used a contraceptive method choosing it. It is not surprising that husband's sterilization, typically done as outpatient surgery, is far more common than wife's sterilization given that the procedure for men is far less involved than that for women. Also, in Nepal there were widespread motivation programs specifically encouraging men to get vasectomies. Mobile male sterilization camps are not uncommon making the costs, including financial, social, and time costs, much lower than for female sterilization.

In Table 4.3 I show how many women whose first method was not sterilization later go on to be sterilized. Looking at the first row we see that 25 percent of women

[10] These measures are of first contraceptive use in the prospective panel data. Twenty-one percent (N=262) of women had used a method prior to 1996. Eleven percent (N=137) of the sample had used Depo-Provera prior to 1996, seven percent (N=83) had used oral contraceptive pills or condoms. I include these women, along with a control for previous contraceptive use, in my analyses to increase sample size.

whose first method was Depo-Provera, an IUD, or Norplant later became sterilized (note: this includes both if the woman herself is sterilized or her husband). In the rest of the table we see that this is essentially true for all women regardless of their first method choice—roughly one quarter go on to be sterilized. In total, 305 women or 41 percent of the women who used a method became sterilized at some point in the 108 month prospective data collection period.

(Table 4.3, about here)

Measures of contraceptive use

The analyses presented in this dissertation focus on the timing of contraceptive use. As shown above, women in this setting use a variety of contraceptive methods so I create several measures of contraceptive use. All these measures will be analyzed in a hazard model framework and describe behavior captured during the prospective data collection period, 1997-2006.

I create five different measures of contraceptive use. The first dependent variable I create is the timing of *any* contraceptive use. I treat this as a transition from not currently using contraceptives to using contraceptives and consider all eight possible contraceptive methods—own sterilization, spouse's sterilization, Depo-Provera, IUDs, Norplant, oral contraceptive pills, condoms, or any other method—in creating this measure. I code a time-varying, dichotomous variable equal to 1 the month the respondent first uses any of these contraceptive methods, and 0 in months prior. Table 4.4 shows the frequencies for this and all of the contraceptive use dependent variables. 733 women, or 58 percent of the analysis sample, use a contraceptive method at some point

(see Table 4.4). Some of this information can be found in Tables 4.1 and 4.2; I repeat it here for clarity.

(Table 4.4, about here)

The last four contraceptive use dependent variables look at the hazard of using a specific method. The second contraceptive use dependent variable I create is of the timing of sterilization only. I will estimate models of the timing of the transition from not being sterilized to being sterilized, including both the respondent's own and her husband's sterilizations. I create a dichotomous variable equal to 1 the month the respondent or her husband first becomes sterilized and zero in months prior. Twenty-four percent of women undergo this transition at some point in the data collection period. I also look separately at the hazard of using Depo-Provera. Women are coded 1 the month they use Depo-Provera, are censored if they become sterilized because they are no longer at risk of using another method, and coded zero in the months prior to first using Depo-Provera. A little over thirty percent of women use Depo-Provera. The fourth dependent variable I create is for the hazard of pill use—I create a dichotomous variable equal to 1 the month the respondent first reported using oral contraceptive pills, zero in months prior, and censored if the respondent becomes sterilized—and the fifth variable is for condom use. Roughly fifteen and 10 percent of women used pills and condoms, respectively, in these data.

Total Effects of Attitudes on Childbearing. My analyses will focus on one contraceptive use outcome at a time. Here I discuss sterilization as an example, although I follow the same steps in my analyses of the other measures of contraceptive use. My models treat the outcome in question as a transition occurring over time, in this case the

transition from never being sterilized to having been sterilized. I use discrete-time event history, or hazard modeling, techniques to estimate these models. These models use person-months as the unit of analysis.

To estimate the overall effects of my measures of attitudes on sterilization I estimate equations in the form:

$$\text{logit}\,(p_{int}) = \beta_0 + \boldsymbol{\beta}_1\mathbf{T}_{int} + \boldsymbol{\beta}_{2n}\mathbf{S}_{nt} + \boldsymbol{\beta}_3\mathbf{A}_{in} \qquad \text{(equation 4.3)}$$

and

$$\boldsymbol{\beta}_{2n} = \beta_2 + \mu_{2n} \qquad \text{(equation 4.4)}$$

for individual i in neighborhood n in month t, where $p_{int} = P[Y_{int} = 1| \mathbf{T}_{int}, \mathbf{S}_{nt}]$; Y_{int} is 1 if individual i becomes sterilized in month t, and 0 otherwise; β_0 is the intercept, $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_3$ are vectors of coefficients. $\mathbf{T}_{int}$ represents a vector of individual characteristics for individual i in neighborhood n at month t that may influence both an individual's attitudes and her contraceptive use behavior. This vector includes those control variables described above. Additionally, to control for the baseline hazard, I include two series of dummy variables for the time since the start of the hazard. Because transportation and the amount of free time, and therefore the ability to obtain contraceptive methods, are both highly influenced by season—roads are often impassable during the rainy season and farmers work very long hours during harvest and planting times—I created twelve dummy variables, one for each month of the year. In each month of exposure one of these variables equals one and the remaining eleven equal 0. January is the excluded variable in the models. Because length of the period of risk is important I also include nine dummy variables for the specific year. For every month one variable is equal to one and the remaining variables equal zero; every 12 months the year variable that equals one

changes. I exclude the last year from the analyses. $\mathbf{S}_{nt}$ is a vector of neighborhood level control variables and $\boldsymbol{\beta}_{2n}$ is the intercept for neighborhood n. Additional individual and neighborhood level control measures are included in all of the analyses in this dissertation. However, these vary depending on the specific analyses so I do not describe them here. They are presented in detail in their respective analytic chapters.

$\mathbf{A}_{in}$ is a vector of attitude variables. The specific attitude measures are discussed in detail in their respective analytic chapters. In all cases, separate models will be estimated to determine the total effects of each attitude measure alone (zero order effects), and the effects of combinations of these attitudes or the independent effects of the attitude measures.

Estimation Techniques for Models of Childbearing Behavior.

The adoption of various contraceptive methods examined in this research are transition processes that occur over time; consequently, I use event history techniques to estimate the models. Continuous time and discrete time multivariate event history models have been used effectively in studies of the determinants of family transition processes, including contraceptive use (Allison 1984; Bumpass and Sweet 1989; Namboodiri and Suchindran 1987; Rindfuss, Morgan, and Swicegood 1988; Teachman 1983). Previous research using these same data has also successfully used these techniques (Axinn and Barber 2001; Ghimire et al. 2006; Yabiku 2004). In general, discrete-time hazard methods approximate the results of continuous-time hazard methods (Allison 1982, 1984; Petersen 1986, 1991). Although continuous-time techniques examine the hazard rate simultaneously across the entire time period under study, the discrete-time approach breaks time into small intervals and studies the process of transition during each of these

discrete periods (Allison 1982; Petersen 1986, 1991). When large time units are used and the dependent event is relatively common, discrete-time methods can suffer from significant time aggregation bias (Petersen 1991). As a result, use of the smallest possible time unit is advantageous in discrete-time approach. Fortunately, these data were designed specifically to provide the measures needed for these types of event history models.

When the transition has only one possible destination state, logistic regression is an appropriate estimation technique for discrete-time hazard models (Allison 1982; Ben-Akiva and Lerman 1987; Guilkey and Rindfuss 1987; Kmenta 1986; Maddala 1983; Peterson 1991). The experiences of contraceptive use are examples of this type of transition.

Estimating Multilevel Event History Models. Again, because of the nested structure of these data I use multilevel estimation techniques. Specifically, I use the multilevel hazard analysis proposed in Barber et al. 2000. To accomplish this I estimate discrete-time hazard models which require four major assumptions: 1) the hazard for each unit of analysis is determined only by his/her own covariates and not the covariates of other subjects; 2) conditional independence; 3) noninformative covariates; and 4) coarsening at random (for a full description of these assumptions see Barber et al. 2000). I use the *GLIMMIX* macro for SAS for logistic regressions when estimating models of contraceptive use.

Health Services, Schools, and Contraceptive Behavior

The final component of my analysis focuses on the effect of variations in dimensions of health services and schools on variations in contraceptive behavior. Once I

have estimated the total effects of these dimensions of health services and schools on contraceptive behavior I will decompose those total effects into indirect effects, which operate via attitudes, and more direct effects on contraceptive use. These analyses will use the same contraceptive use dependent variables as described above. The measures of health services, schools, and attitudes are described in later chapters.

Total Effects of Dimensions of Health Services and Schools on Contraceptive Behavior. The analyses here are similar to those described above regarding the effect of attitudes on behavior. Again, I discuss sterilization as an example.

I begin by estimating the overall effects of the measures of dimensions of social context on the outcome in question. To accomplish this I estimate equations in the form:

$$\text{logit}\,(p_{int}) = \beta_0 + \boldsymbol{\beta}_1\mathbf{T}_{int} + \boldsymbol{\beta}_{2n}\mathbf{S}^{d}_{nt} \qquad \text{(equation 4.5)}$$

and

$$\boldsymbol{\beta}_{2n} = \beta_2 + \mu_{2n} \qquad \text{(equation 4.6)}$$

$\mathbf{S}^{d}_{nt}$ is a vector of dimensions of health services and schools variables and neighborhood level controls. These contextual-level variables are the same as those mentioned when discussing the models of dimensions of health services and schools and attitudes. Again, they are described in detail in Chapters 6 and 7. All remaining components of this equation are the same as described above.

Indirect Effects of Dimensions of Health Services and Schools on Contraceptive Use through Attitudes. To estimate the indirect effects of dimensions of health services and schools on contraceptive behavior via attitudes I will estimate models in the form:

$$\text{logit}\,(p_{int}) = \beta_0 + \boldsymbol{\beta}_1\mathbf{T}_{int} + \boldsymbol{\beta}_{2n}\mathbf{S}^{d}_{nt} + \boldsymbol{\beta}_3\mathbf{A}_{in} \qquad \text{(equation 4.7)}$$

and

$$\boldsymbol{\beta}_{2n} = \beta_2 + \mu_{2n} \qquad \text{(equation 4.8)}$$

where $\boldsymbol{\beta}_3$ is a vector of coefficients and $\mathbf{A}_{in}$ is a vector of attitudes which are discussed in detail in the later analytic chapters.

The difference between the $\boldsymbol{\beta}_{2n}$ in equation 4.5 and the $\boldsymbol{\beta}_{2n}$ in equation 4.7 is equal to the indirect effects of $\mathbf{S}^{d}_{nt}$, dimensions of health services and schools, that influence sterilization through $\mathbf{A}_{in}$, attitudes. The remaining effects of $\mathbf{S}^{d}_{nt}$ in equation 4.7 are the more direct effects of the dimensions that do not operate through the attitudes included in $\mathbf{A}_{in}$. To the extent that direct effects remain, they indicate an influence of context on family formation that cannot be explained by the specific attitude measures, and other controls, included in the model.

The estimation techniques for these models are described above in the section detailing the models of attitudes and contraceptive use.

Common Issues Facing Analyses of Contextual Effects.

As with all studies of the effect of social context on individuals, these analyses face threats to the validity of conclusions about causal connections between macro-level characteristics and micro-level outcomes. Of particular concern here is that 1) individuals may choose to live in specific communities so that selective migration decisions produce spurious associations between dimensions of health services and schools and individual outcomes, and 2) the dimensions of health services and schools may themselves be produced through non-random processes such that the processes producing contextual change create spurious associations between dimensions of health services and schools and individual outcomes.

Both of these threats can lead to overestimates of the effects of health services and schools on attitudes and behaviors and can be considered a problem of missing data (Harding 2003; Holland 1986; Rosenbaum 2002). For the first problem, the missing data are the unobserved characteristics of individuals that influence both the choice of neighborhood and their individual behavior. For the second problem, the missing data are the process through which the dimensions of health services and schools came to be. In all studies linking macro-level characteristics to micro-level outcomes these two problems may lead researchers to incorrect conclusions about the magnitude of cross-level associations.

Fortunately, the data used here provide me with a unique opportunity to address these potential threats. First, because of the highly detailed and comprehensive nature of the data, I have at my disposal many more measures than researchers historically have. This means I am able to include in my models measures of many of the factors often pointed to as possible explanations for observed effects. For instance, I include a wide range of parental characteristics that may influence both neighborhood choice, individual's attitudes, and individual's contraceptive use.

Second, I also include measures of migration that explicitly account for whether the individual moved into the neighborhood in question. Table 4.5 presents some basic descriptives regarding migration. Migration is fairly common in this sample—93 percent of women in my sample had moved at some point before the end of data collection (see Table 4.5). Seventy-seven percent of women in this sample had moved before age 12, 80 percent before the year of the individual level survey, and 94 percent of women had moved either before or the same year as they were married. The average age of women

when they moved into the neighborhood they were living in during 1996 was just over 11.

(Table 4.5, about here)

Another common approach when estimating neighborhood effects is to estimate models with fixed or random effects for each neighborhood (Angeles, Guilkey, and Mroz 1998; Raudenbush and Bryk 1992). The community-level random effects component described above uses detailed community-level measures of factors likely to increase the likelihood a health service or school is constructed. This includes things such as access to other schools, health services, employers, markets, and government centers. The unique historical measures of the communities in this study provide an unusually rich set of random effects adjustments. The procedure itself is analogous to the estimation technique used by Angeles, Guilkey and Mroz (1998) to address the non-random family planning program placement issue.

I am not able to estimate fixed effects models with these data—some neighborhoods did not have large enough samples for the models to estimate properly. This is unfortunate because a fixed effects approach is a relatively conservative strategy and forces the identification of the estimated effects to come from change over time, or interactions between place and change over time, rather than spatial differences. However, given the low levels of inter-class correlation in my random effects models it is unlikely that the neighborhood clustering is problematic and therefore the random effects approach is probably sufficient.

Using these analytic adjustments, of course, does not eliminate endogeneity problems, but they are methods to investigate how my models may be affected by the

non-random assignment of individuals to neighborhoods and allow me to determine how sensitive my estimates may be to this problem. All of the results presented in this dissertation were computed with random effects adjustments.

Table 4.1. Descriptive Statistics, Control Measures

	Mean	SD	Min	Max
Family background				
Father's education (ever went to school)	0.39		0	1
Father's employment (ever had paid employment)	0.45		0	1
Mother's education (ever went to school)	0.10		0	1
Mother's children ever born	5.84	2.44	1	19
Parental contraceptive use (parents ever used)	0.37		0	1
Ethnicity				
Upper caste Hindu	0.45		0	1
Lower caste Hindu	0.10		0	1
Newar	0.07		0	1
Hill Tibeto-Burmese	0.16		0	1
Terai Tibeto-Burmese	0.21		0	1
Birth cohort				
1981-1977 (ages 15-19)	0.35		0	1
1976-1972 (ages 20-24)	0.25		0	1
1971-1967 (ages 25-29)	0.16		0	1
1966-1952 (ages 30-44)	0.24		0	1

N=1262

Table 4.2. Women's Contraceptive Use, First Use in Prospective Data

Method	N	Percent
Any method	737	58.40[a]
Specific method		
Sterilization	162	21.98[b]
Own sterilization	43	5.83
Husband's sterilization	119	16.15
Depo-Provera	328	44.50
Intra Uterine Device (IUD)	10	1.36
Norplant	8	1.09
Pills	108	14.65
Condoms	108	14.65
Other	13	1.76

[a]Percent is out of total number of women in analysis sample (N=1262).

[b]Percent is out of the number of women who reported using any method (N=737). Same is true for rows below.

Table 4.3. Later Sterilization (Own or Husband's) For Women Who Were Not Sterilized at First Method Use

First method used	Later sterilized N	Later sterilized %[b]
Depo-Provera/ IUD/ Norplant[a]	85	24.57
Pills	24	22.22
Condoms	30	27.78
Other	4	30.77
Total women who become sterilized	305	41.38[c]

[a]Because so few women used an IUD or Norplant I combine these three methods.

[b]Percent is out of the number of women who reported using that method as their first method.

[c]Percent is out of the number of women who reported using any method (N=737).

Table 4.4. Frequencies of Contraceptive Use Dependent Variables

Method	N	Percent of women who used a method	Percent of all women
Any method	733	100	58.40
Sterilization	305	40.08	24.17
Depo-Provera	402	52.83	31.85
Pills	188	24.70	14.90
Condoms	136	17.87	10.78

Table 4.5. Migration History For Respondents

	N	Percent of all women in analysis	Percent of women who moved
Ever moved	1177	93.26	--
Moved before age 12	973	77.10	82.67
Moved before 1996	1015	80.43	86.24
Moved before marriage[a]	1163	94.06	98.81

	Mean	SD	Min	Max
Mean age moved into 1996 neighborhood	11.24	8.48	0	39

Total N=1262

[a]10 women moved the same year they were married.

CHAPTER 5

ATTITUDES AND CONTRACEPTIVE USE

Introduction

This chapter focuses on the link between attitudes and contraceptive use. Previous literature in sociology, demography, and social psychology found that attitudes about a specific behavior are related to that behavior (Ajzen 1985, 1991; Ajzen and Madden 1986; Barber 2001; Gillmore et al. 2002; Jorgensen and Sonstegard 1984; Reinecke, Schmidt, and Ajzen 1996). Much of the attitude literature as it relates to contraceptive use has focused on how knowledge about contraception and specific contraceptive methods is related to actual use of contraception (Klitsch 2002; Maharaj and Cleland 2005; Odimegwu 1999; Oni and McCarthy 1991). In this chapter I expand the attitudes-behavior literature by providing new information on the relationship between a wide range of attitudes, including those about contraceptives and those in other domains such as attitudes about children and about non-family activities and contraceptive use behavior.

The theoretical framework I describe in Chapter 2 demonstrates that attitudes from multiple domains should influence contraceptive use behavior. Attitudes about contraception may effect the cost of using contraception including social and psychic costs. Furthermore, attitudes that influence the costs and benefits of childbearing should also play a role in individuals' decisions to use or not use contraception. For instance,

there is some evidence that attitudes about family size and gender preferences are ultimately related to completed family size (Coombs 1974, 1979; Bhat and Zavier 2003). Logically, one could infer then that these attitudes are related to the use of contraception because if people are achieving their desired family size or composition it is likely they are using contraception of some sort to do so. However, little empirical research has examined this relationship between ideal family size or composition and actual contraceptive use. This chapter explicitly models the relationship between attitudes about family size and composition on contraceptive use.

Social pressures and religious norms regarding childbearing are examples of another domain that may influence the costs and benefits of childbearing and contraceptive use. Religious doctrine regarding various religious obligations of children may increase the benefits of childbearing or the costs of contraceptive use. Similarly, religious beliefs may increase the social or psychological costs of using contraception due to specific bans or sanctions regarding contraception.

Another attitude domain that may be related to contraceptive use is attitudes about non-family experiences or behaviors. Because individuals are faced with limited resources they may be forced to choose between family behaviors such as having more children and non-family behaviors such as paying to send ones children to school. Their preferences regarding these non-family behaviors will then influence their assessment of the relative costs and benefits of childbearing versus contraceptive use.

I now turn to a more detailed discussion of some specific attitudes and their relationship to contraceptive use behavior.

Attitudes and contraceptive use

The overarching framework I use to guide my research is described in Chapter 2. Here I provide a detailed discussion of how specific attitudes may influence contraceptive use. I use contraceptive use as the focal behavior because it is a key innovative behavior in this setting. Consequently, in the discussion below, I refer to contraceptive use broadly and use the term to include the many different methods described in Chapter 4. However, when relevant, I discuss how an attitude may or may not be related to the use of a specific method.

Contraceptives. To start, I begin with attitudes closely related to and previously documented to influence contraceptive behavior—attitudes about contraceptives. The link between these closely connected attitudes and behavior follows explicitly from psychological theories of behavior (Ajzen 1985, 1991; Ajzen and Madden 1986). Attitudes are a key determinant of behavior and, when able to, people generally act in accordance with their attitudes. Essentially, women with more positive attitudes about contraception in general and about specific methods are more like to use contraception than women who believe using contraception is wrong or have negative attitudes about specific methods (Casterline, Perez, and Biddlecom 1997; Rutenberg and Watkins 1997; Stash 1999).

There are at least four broad categories of attitudes about contraceptives that may influence later contraceptive use. The first group I describe is overall attitudes towards the use of contraception or family planning methods. Many religions have explicit anti-family planning policies and women who abide by those religious beliefs are not likely to go against the religious doctrine and use contraceptives. Their assessment of the costs of

using contraception will include any social or psychological costs arising from rebuking these doctrines.

On the other side, the Nepalese government has long promoted a family planning program that encourages everyone to use contraceptives. Billboards and posters promoting the benefits of small families and the use of contraceptive methods are clearly visible along roadsides and in market areas. Women who ascribe to these government supported attitudes are more likely to have positive views of contraceptives, and therefore are more likely to assess greater benefits and lower costs to actual contraceptive use.

Three other groups of attitudes about contraception that may influence contraceptive use are more specifically focused on using the method itself. First among these are attitudes about potential side effects from using a method. Women who believe that contraceptives have unpleasant side effects are less likely to use them, all else being equal. The costs of contraceptive use are higher when women expect there to be unpleasant side effects so they will be less likely to use contraception (Becker 1991; Easterlin and Crimmins 1985). This is especially true when looking at specific method use. For instance, if a woman thinks that Depo-Provera has unpleasant side effects she will be less likely to use Depo-Provera, but may not be any less likely to use contraceptive methods overall because she may simply use a different method.

Second, attitudes about the effectiveness of contraceptives are likely to influence the use of them. Women who believe that contraceptives are not effective at preventing pregnancy are not likely to use them for this purpose—they will see little benefit in using a method or undergoing a procedure if they do not believe it will work. Again, these attitudes are likely important in terms of the general effectiveness of contraception, but

also in terms of attitudes about the effectiveness of specific contraception methods and the use of these specific methods.

The last group of attitudes about contraception I investigate are those related to method accessibility. Individuals' perception of how easy or difficult it is to obtain contraception will influence both their actual and perceived costs of using contraceptives. The difficulty, both actual and perceived, in obtaining a method essentially increases the cost of the method, making women less likely to use it. Women who do not believe that they can get contraceptives are less likely to use them, both in terms of contraception as a whole and in terms of specific methods. This happens in two ways. First, this attitude may reflect the structural reality—a woman may believe it is difficult to obtain contraception because it may in fact be difficult. Increased difficulty raises the costs of using contraception, lowering the likelihood a woman will actually use (Entwisle et al. 1997; Freedman and Takeshita 1969; Knodel et al. 1987). Second, the individual's perception that she has little ability to act on her desire or intention to use contraception actually influences the individual's intention (Ajzen 1985, 1991). Women who believe that it is difficult to get contraception are less likely to intend to use contraception and therefore less likely to actually use.

For all of these attitudes about contraception there are two important points to reiterate. First, these attitudes can be about contraception broadly as a general concept or about specific contraceptive methods. Second, an attitude about one specific method may influence the use of that method and the use of other methods. Women who have negative attitudes about one method may be less likely to use that method but if their overall motivation to use contraception stays the same they may be more likely to use a

different method. For instance, viewing condoms as ineffective may lower one's likelihood of using condoms but may not lower one's likelihood of using Depo-Provera. It may actually be associated with a higher likelihood of using Depo-Provera because it will push a potential user away from one method and towards others if she still wants to prevent pregnancy.

Family size and composition. Attitudes about family size and composition also play a key role in an individual's decision whether to use contraception. Arguably the main component of the benefits of contraceptive use comes from the individual's desired family size. Women who desire small families will see larger benefits to using contraception by being able to obtain their family goals. Conversely, those who desire larger families are less likely to use contraception—they see less benefit to controlling their fertility and may want to lengthen their period of childbearing in order to maximize their family size (Coombs 1974; Koenig et al. 1987).

Gender preferences may also influence contraceptive behaviors. Previous research has consistently demonstrated that a strong gender preference for sons corresponds with higher fertility (Basu 1992; Campbell and Campbell 1997; Das 1987; Dreze and Murthi 2001). This is largely a simple problem of mathematics; individuals with strong preferences for one gender are likely to have more children to obtain their desired number of children of their preferred gender. Consequently, they are likely to use contraceptives later in order to provide as much opportunity as possible to obtain the desired gender distribution of children.

Historically in Nepal, families and couples preferred to have many children and especially preferred boys over girls. As new ideas from Western countries began to

spread throughout the country and as the social context began to change, these attitudes began to change and ideal family size decreased and son preference weakened. As a result, a preference for smaller families and less preference for male children is an example of an innovative idea in this setting.

Children and family. According to the theoretical framework I present in Chapter 2, attitudes about children and family may influence the assessment of the costs and benefits of childbearing and contraceptive use. This path of influence is easily applied to considerations of household production—couples have many children because children decrease the workload for other family members or increase the overall production of the household (Cain 1977). At its most unsophisticated, children's value is their two additional hands of labor. When children have a high value or benefit the costs of contraceptive use are also high and women are less likely to use contraception. More broadly, couples who do not believe that having additional children will benefit them are more likely to use contraception. For instance, if couples value other goods such as money, education, or even household items more than they value additional children they will likely choose to use contraception to avoid pregnancy (Barber 2001; Edin and Kefalas 2005).

Individuals may value children for religious or cultural reasons as well (Bennett 1983; Gray 1995). Religious doctrines may influence women's overall attitudes about family and childbearing. For instance, Hindus believe that only a son can perform certain rituals necessary for the father's entrance into heaven and generally prefer larger families than Buddists (Pearce 2000). Women who ascribe to this belief are less likely to use contraception than women who do not feel that having children, or having children of a

specific gender, is necessary for life (or death) fulfillment. When individuals' attitudes or perceptions of social norms are highly pro-childbearing, they may believe that having children is important, irrespective of the economic value of children, placing a high cost on contraceptive use.

Individuals' assessment of the benefits of childbearing may also be effected by how children influence family honor or standing within society. One way family honor is influenced in Nepal is through marriage. Nepal is a Hindu country with a history of little inter-caste marriage. When inter-caste marriages do occur the couple is almost always punished—they may be ostracized from their families and communities, their children may be casteless, or they may be forced to move (Bista 1972, 1991). It is true that inter-caste marriages are becoming more common but they are still rare and newspaper articles still report their occurrence and the subsequent punishment.[11] Because of the high importance of same caste marriage, one benefit to having children comes from their willingness to follow this pattern. Should a child marry someone of a different caste, the costs of having had this child—the social and emotional consequences all family members endure—are raised. For some, these costs may be so great the parents may wish they had never had the child.

The importance women place on caste is also important because it may reflect their attitude towards the larger issue of self-determination. In general, Nepalese life has historically been governed more by fatalism and less by self-determination (Bista 1991). Nepal is officially a Hindu kingdom and a key component of Nepalese Hinduism is belief

[11] One obvious exception to this is marriages between the two highest castes—Brahmins and Chetris—which occur with some frequency. However, even these marriages are considered to be less optimal for Brahmins than Brahmin-Brahmin marriages. Any children from these unions are Chetris, the lower of the two castes, and as a result must follow certain practices such as remaining in certain areas of the kitchen.

in fatalism—individuals often believe they have little, if any, control over their futures (Bista 1991).[12] For example, one common saying in Nepal loosely translates as "one can have only what is written on the forehead" and is in reference to one's fate being ascribed to him at birth (Bista 1991). Under fatalism there is very little benefit from using contraception—childbearing is a piece of life that is predetermined and therefore there is no desire to limit or control it through contraceptive use. As this reliance on fatalism decreases and stronger beliefs in self-determination increase, individuals' may have more desire to control fertility and therefore assess greater benefits to using contraception. To the extent that a high value of inter-caste marriage reflects a stronger connection to fatalism, then disapproval of inter-caste marriage will be related to less use of contraception.

Non-family behaviors. Finally, I consider those attitudes about non-family behaviors such as education and employment. Women who have more positive beliefs about education and employment are more likely to use contraceptives (Barber 2001). This is true both for women's attitudes about their own opportunities and for their attitudes about their children's opportunities, which is what I focus on here. Women who want their children to receive an advanced education or to obtain a well-paying job may desire fewer children because they need to help their children obtain these goals with a limited set of resources. This is the quality-quantity tradeoff commonly talked about in the economics of fertility literature (Becker 1991; Becker and Lewis 1973).

[12] Nepalese Hinduism is different from orthodox Hinduism, especially as it relates to caste. Because there are many different ethnic groups in Nepal the caste hierarchy has been altered to suit the particulars of Nepal (Bista 1991). As a result, the caste system in Nepal does exist, but influences life to a lesser degree than in other settings. However, partly because it is so intricately tied to ethnicity, it is still a reality for virtually all Nepalese, especially with regards to marriage (Bista 1972, 1991).

As a final note with regard to all the attitudes discussed above, the direction of the pathway between attitudes and behaviors may also run in the opposite direction—from behaviors to attitudes (Axinn and Thornton 1993; Festinger 1957; Heider 1958; Thornton, Alwin, and Camburn 1983). Consequently, in the analyses presented here it is imperative to take into account the temporal ordering of the attitudes and behaviors in order to minimize the possibility that I am estimating the effects of behavior on attitudes. More explicitly, the measures of attitudes must occur before the measure of contraceptive use. It is still possible that the intention to use contraceptives was formed before the specific attitude under investigation was and all conclusions I draw will need to address this possibility.

Data and Methods

Data

The data used in this chapter are described in detail in Chapter 4.

Analysis sample. The analysis sample for these analyses are the 1,168 women age 15 to 44 in 1996, married by 2006, and not sterilized before the start of the hazard. Ninety-four women were deleted from the analysis sample described in Chapter 4 because of missing data on several of the variables described below. Most of the missing data is for control measures, but some women all did not have information for the attitude measures.

Measures

Contraceptive use.

The measures for contraceptive use are described in detail in Chapter 4. These measures are used to model the hazard of contraceptive use for the use of any method and separately for sterilization, Depo-Provera, oral contraceptive pills, and condom use.

Attitudes.

I investigate four separate domains of attitudes and their relationship with contraceptive use: contraceptives, family size and composition, children and family, and non-family behaviors.

Contraceptives. I investigate the relationship between four groups of attitudes about contraceptives and subsequent contraceptive use. The first group of attitudes reflects more general attitudes about contraception as a whole. I created four measures to capture the respondent's overall feelings about the acceptability of contraceptive use. The first two measures capture religiously motivated opposition to contraception. Respondents were asked "Do you believe it is sinful to use contraception?" and were coded 1 for this measure if they reported that it is sinful and zero if it is not sinful. The distribution for this variable, and all the other attitude variables are presented in Table 5.1. Thirteen percent of respondents said they believe it is sinful to use contraception.

(Table 5.1, about here)

Respondents were also asked the degree to which they agree or disagree with the statement "A vasectomized man cannot be blessed by God." I recoded responses to this item into a dichotomous variable equal to 1 if the respondent agreed or strongly agreed with the statement and zero if they disagreed or strongly disagreed. Thirty-four percent of

women in this sample expressed some degree of agreement with this statement (Table 5.1). I predict that women who believe it is sinful to use contraception or who believe that a vasectomized man cannot be blessed by God will be less likely to use contraception or use it later (a negative estimated effect). In Table 5.2 I show my predictions regarding the direction of the effect of each attitude discussed here on the rate of any contraceptive use. This table shows both the prediction for the estimated effect and for the odds ratio of that measure.

(Table 5.2, about here)

The third and fourth measures of attitudes about contraceptives capture a broader opposition or support for contraceptive use. Respondents were asked the degree to which they agree or disagree with the statements "Everyone should use contraception or family planning" and "It is wrong to use contraceptives or other means to avoid or delay pregnancy." I create two dichotomous measures based on responses to these questions coded 1 to signify agreement or strong agreement and 0 to signify disagreement or strong disagreement. Eighty-one percent of women agreed that everyone should use contraception whereas fifty-three percent agreed that is wrong to use contraceptives. This means that 45 percent of women in this sample reported that everyone should use contraception but that it is wrong to do so. I predict that women who believe that everyone should use contraception will have higher rates of contraceptive use, and that women who believe that it is wrong to use contraception will have lower rates.

The second group of measures I investigate concern the side effects of specific methods. For vasectomy, female sterilization, Depo-Provera, oral contraceptive pills, and condoms respondent's were asked whether that specific method has unpleasant side

effects and could respond with yes, no, or don't know. For this question "don't know" is a substantively meaningful response, it is not a missing response. As a result, I code "don't know" as a middle category and created five ordinal variables coded 2 if the respondent thought the method did have unpleasant side effects, 1 if she said don't know, and 0 if she reported the method did not have unpleasant side effects. For vasectomy and condoms the mean response was just under 1—most women did not know or thought that these methods did have unpleasant side effects. On the other hand, female sterilization, Depo-Provera, and oral contraceptive pills all had means greater than one signifying that most women felt these methods did have unpleasant side effects. It may not be surprising that women were less certain or more positive about the male methods. Women would never have been able to experience those side effects themselves and are less likely to have heard about the side effects through conversations with people who have experienced them than they would be regarding female methods. Especially in this setting, where gender divisions are common and men and women do not usually have close relationships outside the family, women are more likely to talk with other women about their experiences with contraceptives.

On another note, Depo-Provera was the single most common first method that women used. It is perhaps surprising that it is so popular given the high number of women who believe it has unpleasant side effects. It may be that more women believe it has unpleasant side effects because women are more likely to know someone who used Depo-Provera than any other method, and therefore have greater exposure to the risk of knowing someone who experienced negative side effects.

The third and fourth groups of attitudes about contraceptives I investigate concern the effectiveness and the accessibility of various contraceptive methods. Similar to the question regarding side effects, respondents were asked if each method was effective at preventing pregnancy and separately asked if each method was easy to obtain. Again, I coded don't know responses as the middle category and created ten separate ordinal variables such that respondents who felt a method was effective or easy to get were coded as 2 and those who thought a method was ineffective or difficult to get were coded as 0. The method with the highest mean for effectiveness was vasectomy at 1.67. Female sterilization, Depo-Provera, and condoms all had about the same mean, around 1.3 or 1.4, and oral contraceptives had the lowest mean for effectiveness at 1.22. Overall, more women felt that these methods were effective rather than not.

For vasectomy, Depo-Provera, oral contraceptive pills, and condoms the mean value for accessibility was over 1.4—more women felt it was easy to get these methods. Female sterilization, on the other hand, was seen as more rare and difficult to obtain. It is likely that these attitudes on accessibility reflect the actual accessibility for each method. Female sterilization is an inpatient procedure and is only conducted regularly at the major hospital and on an infrequent basis at government health posts. On the other hand, mobile vasectomy camps are not uncommon in this setting since it is a relatively quick outpatient procedure. The other methods are available at virtually any health clinic or health post with condoms and pills the most accessible from virtually every type of health service provider.

Family size and composition. For the second domain of attitudes I investigate two measures, one of desired completed family size and one regarding gender

preferences for children. The first measure is based on the Coombs Scale, a measure of desired completed family size commonly used in the demographic fertility literature (Hermalin and Liu 1990; Morgan 1982; Thomson and Brandreth 1995). The Coombs Scale comes from a series of three questions, the first of which asks the respondent "If you could have exactly the number of children you want, how many children would you want to have?" In the second question the respondent is asked "If you could not have (the number they just gave) children, would you rather have (one fewer) or (one more)?" In the third question the respondent then chooses between a number one fewer than the lowest number already reported and one greater than the highest number already reported. Based on their responses to these three questions respondents are given a score from 1 to 25 where 1 signifies a desired completed family size of no children and 25 a desired family size of nine or more children. Less than three percent of women scored 11 or higher for this measure. As a result, I recode everyone with a score greater than 10 as 11 so that the distribution for this sample ranges from 1 to 11. The mean value for this measure was 6.07, corresponding with an ideal family size of less than 3.

The second measure of family composition I use is also based on a common demographic fertility measure, this time one of gender preference. Following a similar structure as the Coombs scale, respondents are asked a series of questions in which respondents identify their ideal number of boy and girl children if they had exactly three children. These questions yield a scale ranging from 1 (the respondent prefers three girls) to 8 (the respondent prefers three boys). Few respondents reported preferring girls over boys, again yielding a skewed distribution of the responses. I recode this measure grouping together all responses from 1 to 5 and subtracting four so that the final measure

ranges from 1 to 4 where 1 signifies less preference for boys and 4 more preference for boys. The mean for this recoded measure is 2.40.

Children and family. Related to attitudes about contraception, family size and family composition are broader attitudes about family members' roles and responsibilities and the value and importance of having children. I include five measures of this type of attitude in these analyses. All five measures attempt to capture some aspect of the overall importance of family, but in different domains. The first two measures attempt to capture the respondent's attitudes about the importance of children for life fulfillment or religious obligation. Respondents were asked "Men who do not have children cannot go to heaven. Do you strongly agree, agree, disagree, or strongly disagree with this statement?" I recode this measure into a dichotomous variable equal to one if the respondent agreed or strongly agreed (children are necessary to go to heaven) and zero if the respondent disagreed or strongly disagreed with the statement (you can go to heaven without having children). Only about a quarter of women reported agreeing that men who do not have children cannot go to heaven.

The second measure is based on the degree to which women reported agreeing or disagreeing with the statement "To be an infertile woman is the same as not having a life." I code these responses into a dichotomous variable equal to 1 if the woman strongly agreed, agreed, or disagreed and 0 if she strongly disagreed. Ninety-seven percent of women did not strongly disagreed with this statement.[13]

The third measure attempts to capture the respondent's attitude regarding the relative importance of children versus money. Respondent's were asked "It is better to

[13] These measures are likely related to the questions regarding whether it is sinful to use contraception and whether a vasectomized man cannot be blessed by God, although the correlation coefficients are only .12 and .20 respectively (results not shown).

have many children than to be rich. Do you strongly agree, agree, disagree, or strongly disagree with this statement?" I code this measure a dichotomous measure equal to one if the respondent agreed or strongly agreed and zero otherwise. Twenty-eight percent of women agreed that it is better to have many children than to be rich—that is, almost three quarters of them placed more importance on money than on large families.

The fourth measure attempts to capture the respondent's assessment of the immediate benefits of children. Respondents were asked: "Some people think that having many children would help parents do their work. Do you strongly agree, somewhat agree, or don't agree at all?" I recoded this measure into a dichotomous measure equal to 1 if respondents agreed or strongly agreed and 0 otherwise. Thirty-three percent of women reported that having many children would help parents do their work.

The fifth measure of attitudes about children and family I include in these analyses attempts to capture the relative importance of caste. Respondents were asked: "It is better to have no children than to have a child who marries a spouse of a different caste. Do you strongly agree, agree, disagree, or strongly disagree?" I recoded this measure into a dichotomous variable equal to 1 if the respondent agreed or strongly agreed (inter-caste marriage is unacceptable) and 0 if the respondent disagreed or strongly disagreed (it is acceptable for a child to marry a spouse of a different caste). Just over half of respondents felt that it was unacceptable for a child to marry a spouse of a different caste.

Non-family behaviors. The final group of attitude measures I investigate in this paper are those regarding non-family behaviors that may compete with childbearing. I created four measures of respondent's attitudes towards non-family behaviors. The first

measure I create is based on responses to the question "How important is it to you that a son of yours go to college? Would you say that it is very important, somewhat important, or not at all important?" I code these responses into an ordinal variable equal to 3 if the respondent reported it was very important to her that a son goes to college, 2 if it was somewhat important, and 1 if it was not at all important. There was little variation in this measure—the mean is almost 3 signifying that virtually everyone says it is very important to them that a son of theirs goes to college. The second measure is similar but asks the importance of a daughter going to college. Although there is more variation in this measure almost 90 percent of respondent's still said it was very important to them that their daughter goes to college and the mean value is 2.84.

The third and fourth measures are similar to the first two except they refer to the importance of your son or daughter finding a good paying job instead of going to college. Again, there is little variation in these measures with the mean equal to 2.54 and 2.65 for the importance of sons or daughters finding a good paying job, respectively.

Controls.

Because attitudes and behavior are influenced by similar aspects of an individual and her community it is important to control for many of these to help ensure that the results presented below are not spurious associations. Several of these controls (family background, ethnicity, and birth cohort) are described in Chapter 4 and descriptive statistics are presented in Table 4.1. Here I describe several additional measures.

The theoretical framework described in Chapter 2 illustrates that organizations in ones community are an important influence on individuals' attitudes and behaviors both through experiences with those organizations and through simple exposure to them.

Substantial bodies of literature provide evidence that education, work, and living experiences, media exposure, participation in groups, and receipt of health services are all related to family related behaviors and attitudes (Axinn and Barber 2001; Axinn and Yabiku 2001; Barber 2004; Barber and Axinn 2004; Barber et al. 2002; Caldwell 1982; Lloyd, Kaufman, and Hewett 2000; Thornton, Alwin, and Camburn 1983). As a result, I control for both an individual's experiences and exposure to various aspects of community context.

The first measures refer to the respondent's childhood and I create two indexes—one based on experiences and one on exposure. For the index of experiences I created a series of nine dichotomous variables equal to one if the respondent had gone to school, worked for pay outside the home, lived away from her family, visited a health post, seen a movie, listened to the radio, watched television, or participated in a club or group[14] before the age of 13 and zero otherwise, respectively. I then summed these nine variables to create an index of the number of individual's non-family experiences. In Table 5.3 I present basic descriptive statistics for this summary index measure, along with those for the other control measures included in these analyses. The mean number of non-family experiences women in this sample had by age 13 was 2.65, or just under three experiences. Some of these experiences such as working for pay, living outside the home, and participating in a youth club or group are quite rare and no one had experienced all

[14] Groups refers to community based groups focusing on issues including women's issues, seed dispersion, micro-loans, and social groups.

nine activities. Creating an index allows me to include these experiences in the model without creating estimation problems due to small sample sizes.[15]

(Table 5.3, about here)

The second measure of childhood refers to the community the respondent lived in before age 12. This index is measured at the individual level. During the individual interviews respondents were asked numerous questions about the community they lived in before age 12. I use information from these questions to create the measures of childhood community characteristics. Following previous research, I created five dichotomous variables equal to one if the respondent had a school, employer, market, bus stop, or health service within an hours walk of her neighborhood before she was 12 years old and zero otherwise. I then sum these dichotomous measures to create an index of community characteristics during childhood (Axinn and Yabiku 2001; Brauner-Otto et al. Forthcoming). Like the measures of individual experiences before age 13, some of these community characteristics have little variation and combining them into an index measure allows for a simpler more easily estimated model. Over 90 percent of women had a school within an hours walk before the age of 12. The least common organizations were non-family employer and bus stop—66 percent of women had either within an hours walk. The mean number of organizations within an hours walk of their community before age 12 for the women in this sample was 3.88.

[15] I also estimated models with these measures entered as separate dichotomous variables and models with an index of only the most common experiences. Only visiting a health service was positively and significantly related to the hazard of contraceptive use. Importantly, since these are only included as control measures, the different model specifications did not change the substantive results regarding the relationship between attitudes and the hazard of contraceptive use. Also, because of collinearity among these measures and with the measures of individual experiences later in life (discussed below) I elected to include these measures as an index and not as separate measures.

Childhood experiences are not the only ones that may influence an individual's attitudes and behavior. Individuals continually re-evaluate their situations and incorporate new information and experiences into their current behavioral choices (Glasman and Albarracin 2006). Consequently, I also create a series of measures that account for both an individual's experiences and exposure to various aspects of community context from age 13 to the date of the interview. To control for individual experiences after age 13 I again create an index of experiences. This measure is similar to that described above for experiences before age 13 except it does not include a measure of schooling. Instead, because both enrollment and attainment are important features of experiences with schools (Blossfeld and Huinink 1991; Thornton, Axinn, and Teachman 1995), I create two separate measures for schooling—a dichotomous measure equal to one if the respondent was currently enrolled in school in 1996 and zero otherwise, and a count measure of the number of years the respondent had attended school. The mean number of individual experiences after age 12 was 2.34 for the women in this sample, 22 percent of women were enrolled in school in 1996, and the mean number of years enrolled in school was 6.57.

To capture more recent community characteristics I created an index variable similar to that described above for childhood community except that it refers to the respondent's community in 1996 and includes three additional features of community context.[16] I created eight dichotomous variables equal to one if the there was a school, employer, market, bus stop, health service, mill, dairy, or temple within a five minute

[16] Information on these additional features, mills, dairies, and temples, was not obtained for respondents' neighborhoods before age 12. I also tested models that included only those aspects of community context also available for childhood community. Excluding these three additional features of community context, especially whether a mill was nearby, did not change the effect estimates, but it did increase their standard errors.

walk from the neighborhood the respondent was living in at the time of the 1996 interview and then summed these measures to create an index. These measures use information from the Neighborhood History Calendars and are therefore neighborhood level measures—they do not vary at the individual level. However, I present their descriptive statistics at the individual level in Table 5.3. The mean number of organizations within a five minute walk in 1996 was 2.91 for the women in this sample.

A third group of controls I include in these models account for the respondent's childbearing history and contraceptive use before the prospective data collection. The number of children a woman has given birth to and the number who have died are related to her likelihood of using contraceptives and also probably related to her attitudes about contraception and family. I create two count measures—one for the number of children the respondent reported giving birth to and one for the number she reported who had died, both by 1997. I also created one dichotomous measure equal to one if the respondent had used contraception prior to the start of the regular prospective data collection.[17]

Because I do not know when the specific attitudes measured here were formed, only what they were at the time of the interview, it is possible that the these later life experiences and community context actually occurred after the attitude was formed. In this case including them as controls in the model would be incorrect given their relative temporal ordering. However, if the attitudes were formed earlier in life then the later life experiences and community characteristics could be mechanisms through which the attitudes influenced behavior. Then, the estimates from models including the later life

[17] As you can see in Table 5.3., 22 percent of women in this sample had used a method prior to the 1996 interview. When I remove these women from the analysis sample and estimate the same models the effects are virtually the same as those presented here.

experiences and community characteristics would under-estimate the effect of attitudes on contraceptive use. I estimated models excluding these later life experiences and community characteristics and the results were similar to those presented below. In general the effect estimates increased slightly and the standard errors decreased slightly in these smaller models. I present the full models here as conservative estimates of the relationship between attitudes and contraceptive use.

Finally, I control for migration. I create a dichotomous measure equal to one if the respondent had ever moved before 1996. Since virtually all women move out of their natal homes when they marry, and for many this involves a move to a different neighborhood, it is not surprising that 80 percent of women had moved before 1996.

Analytic Strategy

There are two main empirical objectives for this chapter. First, I examine the separate relationship between multiple domains of attitudes and contraceptive use as an empirical test of the theoretical framework discussed in Chapter 2. I first investigate attitudes about contraception and about specific methods. Then, I provide new information on how attitudes in other domains, such as those about family size and composition, children and family, and non-family behaviors, are related to contraceptive use. The second empricial objective is to determine which attitude measures are independently related to contraceptive use. This model will more closely represent an individual's actual decision making process because it will include measures of the multiple domains of attitudes that may simultaneously influence contraceptive use. I first discuss models of the relationship between measures of attitudes from one domain and any contraceptive use. Next I present the results for the hazards of using a specific

method for each domain. I then move on to the next attitude domain. After estimating the separate effects of the measures of all four attitude domains on all five dependent variables I estimate their independent effects.

The specific estimation strategy is presented in detail in Chapter 4. Here I provide only a brief summary. I treat the outcome in question (any contraceptive use, sterilization, use of Depo-Provera, oral contraceptive pills, or condoms) as a transition occurring over time—for instance the transition from never being sterilized to having been sterilized. For the models of the hazard of using Depo-Provera, oral contraceptive pills, or condoms women are censored in the month they become sterilized. I use discrete-time event history techniques to estimate the models with person months are the unit of analysis. The hazard starts in March 1997, the first regular interval in the prospective data. The specific equations I estimate are presented in equations 4.3 and 4.4 in Chapter 4.

Results

The coefficients displayed in the following tables are the multiplicative effects on the odds of using contraception. An exponentiated coefficient greater than 1.00 represents a positive effect, less than 1.00 a negative effect, and equal to 1.00 no effect. Because the frequency of events, contraceptive use, in any one month interval is quite small, the odds of contraceptive use are very similar to the rate, and I discuss the results in terms of rates.

Contraceptives. Table 5.4 presents the estimates for models of the relationship between attitudes about contraception and the hazard of any contraceptive use. In Model 1 I show the odds ratio for whether the respondent reported it was sinful to use contraception or not. Women who reported that it was sinful to use contraception had rates of any contraceptive use 25 percent lower (1-.75=.25) than women who said it was

not sinful. In Models 2 and 4 we see that neither of these measures of attitudes about contraception are statistically significantly related to the hazard of any contraceptive use. Model 3 shows the results for a measure of the general support of contraceptive use. Women who agreed with the statement that everyone should use contraception had rates of contraceptive use 33 percent higher than women who disagreed with the statement.

(Table 5.4, about here)

Although not the focus of this chapter, there are several findings regarding the control measures worth discussing. Somewhat surprisingly, the measures of childhood exposure to and experiences with non-family organizations were not statistically related to the hazard of contraceptive use. Previous research in this setting on the use of long-term contraceptive methods such sterilization and Depo-Provera found that childhood exposure to and experiences with non-family organizations were related to higher rates of contraceptive use (Axinn and Yabiku 2001; Axinn and Barber 2001; Barber and Axinn 2004; Brauner-Otto et al. Forthcoming). However, this research looked at events and communities in the 60 years prior to the data analyzed here. It is possible that the lack of findings regarding the influence of non-family organizations in the analyses presented here is because given the recent and rapid growth in the spread of these organizations they no longer have the dramatic effects on behavior seen previously. Alternatively, because these analyses only look at events occurring over a nine year period there may not be enough statistical power in the models to detect these effects of non-family organizations.

The findings regarding more recent experiences with and exposure to non-family organizations were more consistent with previous research. Women who were enrolled in

school in 1996 had higher rates of contraceptive use. This may be because of role conflict if those women stayed in school for some time after 1996 or because these women are generally younger. Also, women whose neighborhoods in 1996 had more community services close by had higher rates of contraceptive use.

Other findings regarding controls are as I predicted. Women who had given birth to more children had higher rates of any contraceptive use, as did women who had previously used a contraceptive method. The only parental characteristic statistically significantly related to the hazard of any contraceptive use was father's employment—women whose fathers had worked outside the home for pay had rates of contraceptive use roughly 12 percent higher than women whose fathers had not worked outside the home. Additionally, there was some variation across ethnic groups with Hill Tibeto-Burmese women having higher rates of any contraceptive use than Upper Caste Hindu women and Terai Tibeto-Burmese women having lower rates. Also, women born in different birth cohorts had different rates of any contraceptive use—older women, those born in 1971 or before, were less likely to use contraception than women born between 1977 and 1981.

Hazards of using specific contraceptive methods. I also ran models estimating the effects of these attitudes about contraception and the hazard of being sterilized, using Depo-Provera, using pills, and using condoms. The first measure, that regarding whether or not contraceptive use is sinful, was statistically significantly related to both the hazards of sterilization and of Depo-Provera use. Women who agreed it was sinful had lower rates of sterilization and of using Depo-Provera. Also, for both the hazards of sterilization and for using pills the variable for everyone should use contraception was statistically significant. The effect size for the hazard of sterilization and of pill use were somewhat

larger than for the hazard of any contraceptive use, 1.53 or 1.57 versus 1.33 (not shown in tables), but it is not possible to determine whether these estimates are actually different from one another. None of the other measures of general attitudes about contraceptives were related to these method specific hazards of contraceptive use.

Tables 5.5, 5.6, and 5.7 present the results for the relationship between method side effects, effectiveness, and accessibility and contraceptive use, respectively. In Table 5.5 I show the models of attitudes about contraceptive method side effects and the hazard of any contraceptive use. The only measure of perceptions of side effects significantly related to the hazard of any contraceptive use was for vasectomy. Women who thought that vasectomies have unpleasant side effects had rates of any contraceptive use 12 percent lower than women who didn't know if vasectomies had unpleasant side effects and 23 percent lower ($1-.88^2=1-.77=.23$) than women who did not think that they did.

(Table 5.5, about here)

Hazards of using specific contraceptive methods.[18] There are a couple interesting points regarding the relationship between attitudes about side effects of specific methods and the hazards of using these contraceptive methods (not shown in tables). Women who thought that Depo-Provera had unpleasant side effects had lower rates of using Depo-Provera but had higher rates of sterilization. This is what we would expect—women who think Depo-Provera has unpleasant side effects are less likely to use it and more likely to use another, similarly permanent method. On the other hand, the attitude that vasectomy has unpleasant side effects was negatively and significantly related to the hazards of

[18] Because attitudes about method side effects may increase the use of some methods and decrease the use of others, these analyses are evaluated using two-tailed significance tests. The same is true for the models of the relationship between attitudes about effectiveness and accessibility and the hazards of using specific methods.

using Depo-Provera and condoms but not of sterilization. So, women who thought that vasectomies had unpleasant side effects had lower rates of using Depo-Provera and condoms but not of being sterilized or using another method.

Looking at Table 5.6 we see that women who believed Depo-Provera, birth control pills, and condoms were effective at preventing pregnancy had higher rates of any contraceptive use than women who did not think they were effective. The effectiveness of sterilization does not appear to be related to any contraceptive use.

(Table 5.6, about here)

Hazards of using specific contraceptive methods. From the models of the method specific hazards (not in tables) we learn that the effect of attitudes about the effectiveness of Depo-Provera and pills on the hazard of any contraceptive use is actually due to their effect on the hazard of using that specific method. That is, women who said that Depo-Provera was effective at preventing pregnancy had higher rates of using Depo-Provera, and women who said birth control pills were effective had higher rates of using pills. However, the effectiveness of condoms was not related to the hazard of any specific method.

Interestingly, we again see evidence of a strong inverse relationship between attitudes about female sterilization and pill use—women who thought that female sterilization was effective at preventing pregnancy had lower rates of pill use than women who did not think it was effective. If becoming sterilized and using the pill are competing risks, that is women can choose between the two contraceptive methods to achieve essentially the same goal in their eyes, then their belief that one method is ineffective leads to higher rates of using the other method.

Finally, in Table 5.7 we see that women who thought that Depo-Provera or condoms were easy to obtain had higher rates of any contraceptive use than women who thought they were more difficult to obtain. The accessibility of sterilization and of birth control pills were not related to the hazard of any contraceptive use.

(Table 5.7, about here)

Hazards of using specific contraceptive methods. In general, very few of the measures of accessibility were related to contraceptive use. Women who believed that Depo-Provera was easy to get had higher rates of using it and attitudes about the accessibility of condoms were related to the hazards of sterilization, Depo-Provera and pill use, but not to the use of condoms.

Family size and composition. In Table 5.8 I show the results for the measures of family size and composition. Neither measure was statistically significantly related to the hazard of any contraceptive use.

(Table 5.8, about here)

Hazards of using specific contraceptive methods. Interestingly though, the gender preference scale was statistically related to the hazard of using condoms. Women who preferred sons over daughters had lower rates of using condoms.

Children and family. Table 5.9 presents the results for the models of attitudes about children and family and any contraceptive use. All five attitude measures were statistically significantly related to the use of any contraceptive. The first measure had the smallest estimated effect—women who said that men who do not have children cannot go to heaven had rates of any contraceptive use 14 percent lower than women who disagreed with this statement (Model 1). The second measure, that of the importance of having

children, had the largest effect—women who strongly agreed with the statement that to be infertile is the same as not having a life had rates of any contraceptive use 36 percent lower than other women (Model 2). It is not surprising that this effect is so much larger than those for the other measures given the comparison for this measure is between women who strongly agreed versus agreed, disagreed, or strongly disagreed whereas it is between agreement (strong and otherwise) versus disagreement for the other measures. However, when I code this variable into these later groups the effect is not statistically significant.

(Table 5.9, about here)

Women who agreed that it was better to have many children than to be rich (Model 3) or that having many children would help parents do their work (Model 4) had rates of any contraceptive use 27 and 15 percent lower than women who disagreed with these statements, respectively. Finally, the measure I investigate regarding the importance of caste was also statistically significant—women who felt that it was unacceptable for their children to marry someone of a different caste had rates of contraceptive use 15 percent lower than women who thought inter-caste marriage was acceptable (Model 5).

Hazards of using specific contraceptive methods. Although all five of these measures of attitudes about children and family are related to the hazard of any contraceptive use, the same is not true for the method specific hazards. In fact, three of the attitude measures were only related to the hazard of using one specific method. The second measure was related to the hazard of using Depo-Provera—women who believed that to be infertile is the same as not having a life had lower rates of using Depo-Provera than women who did not believe this. The measure regarding children's household labor

contribution was only related to the hazard of using condoms. Women who agreed that having many children helps parents with their work had lower rates of using condoms than women who disagreed with this statement. The measure regarding intercaste marriage was only statistically significantly related to the hazard of sterilization.

The measure based on the statement "Men who do not have children cannot go to heaven" was related to the hazard of sterilization and condom use. Women who agreed with this statement had lower rates of using both methods.

Finally, women's attitudes regarding the relative importance of children and money was significantly related to the hazards of using Depo-Provera, pills, and condoms. Women who felt that it was better to have many children than to be married had lower rates of using Depo-Provera, pills, and condoms, but not lower rates of being sterilized, than women who felt that money was more important than large families.

Non-family behaviors. Finally, in Table 5.10 I present the models with the measures of attitudes towards competing behaviors. In Model 1 we see that women who thought it was important that a son of theirs goes to college had higher rates of contraceptive use. Specifically, women who felt it was very important had rates of any contraceptive use 64 percent higher than women who felt it was not at all important (1.28^2=1.64). According to the theoretical framework presented earlier this may be because these women want to invest resources in fewer children to ensure that the children they have can go to college—they are choosing quality over quantity. The measure regarding sons' employment was also significant. Women who thought it was important their son find a good paying job had higher rates of contraceptive use. None of

the measures regarding preferences for daughters' non-family opportunities were statistically significantly related to the hazard of any contraceptive use.

(Table 5.10, about here)

Hazards of using specific contraceptive methods. Women's attitudes regarding their son going to college were also statistically significantly related to the hazard of using condoms, as were the measures of women's attitudes towards their daughters' education and their sons employment. Also, women who thought it was important that their son find a good paying job had higher rates of pill use. None of these attitude measures were related to the hazards of sterilization or of using Depo-Provera.

Independent effects. Establishing the separate effects for each attitude measure, as done above, is a first step in understanding the attitudes involved in individuals' decision making processes. A crucial second step is to examine the independent effects of these measures. In reality individuals are simultaneously incorporating multiple attitudes from multiple domains in any one given decision making process. By estimating models that include multiple attitude measures in one model we are taking a step closer to modeling actual decision making processes. In Table 5.11 I present the results from some of these combined models.

(Table 5.11, about here)

Model 1 includes the two statistically significant general attitudes about contraception from Table 5.4. Here we see that they both maintain their independent effects and the size of the effect remains quite similar. Women who believe it is sinful to use contraceptives have a 24 percent lower rate of using any contraceptive than woman who do not believe it is sinful, controlling for whether they believe everyone should use

contraception. Conversely, women who believe everyone should use contraception have rates of any contraceptive use 31 percent higher than women who do not, controlling for whether they believe it is sinful to use contraceptives.

The fact that these two variables maintain independent effects allows us to see the nuances in the attitudes they may be capturing. The first measure specifically refers to ones religious beliefs regarding contraception, where as the second refers to an obligation to use contraception. Although it is likely that most people who believe it is sinful will not then think everyone should use contraception, it is not necessarily the case. In fact, nine percent of women in this sample reported that it is sinful to use contraception but also agreed or strongly agreed with the statement that everyone should use contraception. In Nepal, where there have been considerable public efforts put into family planning awareness campaigns women likely hear conflicting messages—their religious leaders may tell them that contraception is sinful, but their political and community leaders may tell them that they have an obligation to their community to use contraception. In this case, they may have responded to these two questions based on two separate underlying attitudes—one based on religion and one based on community obligation.

In Model 2 I combine the statistically significant measures of attitudes about specific contraceptive methods into one model. Attitudes regarding whether vasectomies have unpleasant side effects, effectiveness of Depo-Provera, and the accessibility of condoms retain their statistical significance in this combined model. The size of the effect

for the attitudes about effectiveness and accessibility and the precision with which those effects are estimated decreases when they are combined into the same model.[19]

In Model 3 I present the results of the model that combines all five measures of attitudes about children and family. Three of these attitude measures do maintain independent effects: those about infertility, the relative value of children versus money, and intercaste marriage. The measures of whether men can go to heaven if they do not have children or if children help parents with their work did not maintain statistically significant independent effects.

Model 4 includes the two previously statistically significant measures of non-family attitudes. Only the measure regarding sons' college remained significantly related to the hazard of any contraceptive use.

Finally, in Model 5 I combine all the measures that were statistically significant in Tables 5.4 through 5.10. The results in this final model are essentially the same as in Models 1 through 4.

Hazards of using specific contraceptive methods.[20] To assess the independent effects of attitudes on the hazard of using a specific contraceptive method I include all the measures that separately were statistically related to the hazard of using that method in one model. As with the models of any contraceptive use, I first grouped the measures according to their substantive area and then I combine them into one full model. In Table 5.12 I present the final model for the separate method hazards.

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[19] In models where I only include the significant measure of effectiveness from Table 5.6 the measure of condom effectiveness does have an effect independent from that of the effectiveness of Depo-Provera. Also, in a separate model based on Table 5.7, the accessibility of Depo-Provera maintained an effect independent from that of the accessibility of condoms.

[20] I evaluate all odds ratios in these models using one-tailed significance tests. The specific direction was based on the two-tailed tests used in the separate analyses described above.

In Model 1 present the results for the hazard of sterilization. Here we see that when all the attitude measures that separately were related to the hazard of sterilization are included in one model, half maintain independent effects: the broad measures of attitudes about contraception and the side effects associated with Depo-Provera. Women who did not think it was sinful to use contraception, agreed that everyone should use contraception, or thought that Depo-Provera had unpleasant side effects had higher rates of sterilization.

(Table 5.12, about here)

In Model 2 I show the independent effect estimates of the attitude measures on the hazard of using Depo-Provera. Almost all of these attitude measures retain an independent effect when included in the same model. The exceptions are the measure regarding whether contraceptive use is sinful and whether female sterilization is effective. Model 3 shows the results for the hazard of using pills. Only the effect of the measure regarding the importance of one's son finding a good paying job was not statistically independent. Finally, in Model 4 I show the results for the hazard of using condoms. Again, roughly half the attitude measures maintained independent effects. Women who thought it was wrong to use contraceptives, that condoms have unpleasant side effects, desire larger families, that intercaste marriage is wrong, that having many children helps parents with their work, or that it was important that their daughter goes to college had higher rates of using condoms.

Summary of Results

Because this chapter contains multiple analyses of multiple measures of attitudes from multiple domains I provide a brief summary of the results to help clarify them for the reader.

Contraception. We learn several important pieces of information from the models of the relationship between attitudes about contraception and the hazard of contraceptive use. First, broad attitudes about contraception, specifically support of the idea that everyone should use contraception is independently related to the hazard of any contraceptive use. The somewhat normative phrasing of this specific measure should be considered. One barrier to the adoption of innovative behaviors may be social disapproval. Women who perceive that a certain behavior is the socially accepted choice, even if it conflicts with their own personal interests or preferences, may be more inclined to adopt the new behavior than women who believe the behavior is socially undesirable. In this situation, mass media or education efforts focused on changing women's perceptions of the social view of contraception may be an important policy move. What is important here is that women *think* that contraceptive use is the socially appropriate behavior, not that everyone is actually using contraception. So, a media campaign that conveys the idea that everyone is already using contraception, as opposed to one that attempts to convey the idea that everyone should use contraception, may be the appropriate policy to implement if the goal is to increase contraceptive use.

A second important point from the models that include attitudes about specific contraceptive methods is that women who believe that men experience unpleasant side effects from having a vasectomy have lower rates of any contraceptive use but that this

appears to be due to the effect this attitude has on the hazard of using Depo-Provera, and not on the hazard of sterilization as we would have expected. One previously commonly held belief in Chitwan is that men who have vasectomies will be weaker and unable to do their necessary farm work after the procedure. However, in previous decades there were very active, high-profile sterilization campaigns in Chitwan that included widespread dispersal of information on vasectomies, some of which was explicitly designed to counter this belief. It may be that this measure is actually capturing something other than the specific attitude about vasectomy side effects, and is instead capturing some aspect of physical or social isolation so that those people who still hold this belief were, for whatever reason, not reached or influenced by this government effort. In this case, the observed effect would actually be the effect of isolation on the use of Depo-Provera.

Third, there does appear to be some relationship between perceptions of method effectiveness and contraceptive use, but the exact nature of this effect is not clear. For Depo-Provera and pills the models presented here support the expected relationship—women who believed that Depo-Provera or pills were effective in preventing pregnancy had higher rates of using Depo-Provera or pills, respectively. However, the effect estimates for the measures of the perceived effectiveness of sterilization and condoms were not statistically related to the hazard of either method. Interestingly, women who believed that female sterilization was not effective had higher rates of using pills so there does seem to be some amount of pushing and pulling towards and against various methods based on attitudes about each method.

A fourth, and final, interesting point regarding attitudes about contraception concerns the effects of measures of perceived availability of methods. A substantial body

of literature documents that access to methods is important in predicting contraceptive use, especially in predicting method choice (Entwisle et al. 1996; Entwisle et al. 1997). However, the findings here paint a more complicated picture. It does appear that women who believe that Depo-Provera is easy to obtain have higher rates of using Depo-Provera and of using any contraceptive method. This is not the case for sterilization, pill, or condom use—the perceived availability of these methods was not related to women's use of them. Additionally, women's perceived availability of condoms was significantly related to all the hazards of contraceptive use, except for that of condom use. Because condoms are by far the most commonly available method in Chitwan, it may be that this measure is picking up the effect of something such as simple exposure to health services. Future research may want to model explicitly the relationship between actual method availability, individual's perceived availability, and individual's actual contraceptive use.

Family size and composition. Perhaps the most disappointing results presented in this chapter concern the relationship between attitudes about family size and composition and the hazard of contraceptive use. The measure of desired family size was not significantly related to any of the hazards of contraceptive use, and that of gender preference was only related to the hazard of using condoms. These findings are troubling for two main reasons. First, considerable research has documented that preferred family size and composition predicts actual completed family size and the use of contraception is the most logical method of altering fertility to obtain that family size. Even without a clear theoretical framework outlining the direct relationship between attitudes about family size and composition and actual contraceptive use we would expect to see an empirical relationship given this previous literature on completed family size. But, we do

have this clear framework which leads to the second troubling aspect of these results. The theoretical relationship between ideal family size and completed family size is at the backbone of this framework—people act so as to reach their goals; women will use contraception to achieve their desired family size. The results here raise a small cautionary flag when referring back to the original guiding framework.

It is, however, a small flag. There are at least three possible explanations for why I observe no significant relationship between ideal family size and later contraceptive use in these analyses. First, women's ideal family size may not be a stable concept. Because the hazard models model behavior that occurs over a nine year period, and ideal family size is only measured before that period begins, it may be that at some intervening point women's ideal family size has changed. For example, a woman may have said she wanted 4 children in 1996, but then a few years later, perhaps after having a child, decides she wants only 2 and uses contraception early despite having reported a larger ideal family size in 1996. Conversely, a woman may have said she wanted only 1 child, but then later decides she would like a larger family and therefore does not use contraception.

This leads me to the second possible explanation, the women in my sample are all at different stages in their lives, and, especially relevant, at different stages of their childbearing careers. I group women who were unmarried with no children in 1996 together with women who had been married for 15 years and had 5 children in 1996. These varied life experiences may be masking any relationship between ideal family size and contraceptive use. Because actual children ever born and ideal family size are correlated (in these data the Pearson's correlation coefficient for the measure of the

number of children the woman reported giving birth to by 2005 and her value for the Coombs scale of ideal family size is .45) the controls for previous childbearing experiences may be picking up the effect of childbearing experiences and ideal family size. Additional analysis on a subsample of women with similar childbearing experiences before 1996 when the measure of ideal family size was obtained may provide more promising empirical evidence regarding the relationship between ideal family size and later contraceptive use.

A third potential explanation for the lack of significant findings shown here is that these analyses also combine women of very different ages from different birth cohorts in one analysis. Previous research using these data has found that both ideal family size and contraceptive use vary greatly by birth cohort and that only for certain cohorts were there statistically significant relationships between the two (Pearce 2000). Among the analysis sample used here ideal family size decreases substantially with each successive cohort and it may be that the measure of birth cohort is picking up the effect of ideal family size, similar to the explanation regarding previous childbearing described above. Again, future analyses may want to look at the relationship between ideal family size and contraceptive use separately for women in different birth cohorts to ascertain whether this relationship does vary by cohort.

Although these additional avenues of research may yield important information regarding the relationship between ideal family size and contraceptive use for different subgroups, what we learn here from the lack of significant findings is still of great importance, especially as it contrasts to the effects of other attitudes. The results presented in this dissertation chapter do not provide evidence that, for women aged 15 to

44 in Chitwan, family size and composition have independent effects on contraceptive use beyond any effects of birth cohort or previous childbearing experiences. In contrast, there are many other measures of attitudes about children and family that do maintain a strong influence on contraceptive behavior across birth cohorts and for women with different childbearing histories. I now turn to a discussion of these findings.

Children and family. Arguably the most important findings in this chapter are in this section. The analyses presented here provide strong evidence that attitudes from multiple domains do influence one behavior. Substantively there are two points I would like to stress. First, attitudes directly related to the value of children matter in terms of the decision to use contraception. This value may come from straight forward economic considerations such as whether it is better to have many children or more money or whether children contribute to household production. Importantly, the value of children may also come from other aspects of life such as through their role in fulfilling religious obligations. Second, measures of other attitudes that attempt to capture the innovativeness of the respondent's attitudes as they relate to family more broadly are also an important piece of the decision to use contraceptives. In Table 5.11 we see that even when accounting for attitudes about contraceptive use, about specific contraceptive methods, and about the economic and social value of children, this measure of how the individual views the longstanding traditions of caste separation still has a significant relationship with actual contraceptive use.

Important for developing our theoretical frameworks for understanding how attitudes influence behavior and expanding our empirical knowledge of this process, these results show that it is important to recognize that behaviors do not occur in a

vacuum. There are multiple factors entering into any one behavioral choice—models that do not incorporate attitudes from multiple domains may not accurately describe the attitude-behavior link.

Another important implication of these findings for theory development is that according to these analyses ideational factors can be a mechanism through which social change occurs. All of these analyses include a substantial number of controls for structural factors that may influence the widespread adoption of contraceptive methods such as controls for access to and exposure to health services, schools, employment opportunities, and mass media. The results presented here show that ideas have effects independent from structural factors and from attitudes that reflect structural causes of behavior such as the measures of perceptions of method accessibility.

Method specific hazards. There are two important points to discuss regarding the method specific hazard models. First, generally perceptions of the effectiveness of specific methods are related to the use of that specific method, but not to the use of any contraceptive. That is, effectiveness influences method choice, but not the use of contraception over all. These results support the idea that there are both pull and push factors involved in choosing methods. Some women may choose a method because they believe that method is more effective, whereas others may choose a method because they believe the alternative is ineffective. Second, women's concerns over the potential side effects of specific contraceptive methods do not seem particularly influential in terms of their actual contraceptive use, but concerns over the availability of methods are influential.

Discussion

In sum, there are three important empirical findings to take away from this chapter. First, attitudes from multiple domains, including those not directly about contraceptives, have large, precisely estimated effects on actual contraceptive use and these effects are independent of other attitudes. Women's attitudes about the importance of childbearing, the relative value of children, and the importance of child obedience with respect to marriage and caste were all related to the hazard of contraceptive use, independent of beliefs about the effectiveness, accessibility, or side effects of contraceptive methods. These results provide additional evidence that decisions about contraceptive use, childbearing, and family are complex and incorporate multiple domains. This evidence may be especially useful information for researchers studying adolescent sexual behavior in the United States. Adolescent sexual behavior is complicated and often involves different assessments of the relative costs and benefits of childbearing and contraceptive use than for older couples (Luker 1996). Collecting data on how adolescents assess these relative costs and benefits may provide valuable new information useful in designing programs and policies that lower sexual risk taking.

This conclusion, that it may be important to take a wide view of factors that influence behavioral decision-making, has important implications for researchers studying numerous other individual behaviors. Referring back to the theoretical framework I present in Chapter 2, these results provide evidence that the costs and benefits of childbearing are equally relevant to contraceptive use decision-making as those about contraception itself. We must take a broader approach to studying behavior and look widely to determine what factors influence each behavior. Sociologists have

long been aware that individuals operate within the larger confines of society (Durkheim [1933]1984; Mead [1934]1967; Weber [1930]2006). But as sociological research has expanded to include more social-psychological issues and theories, the empirical research has had a narrow focus. Researchers often focus on a very limited piece of the behavioral process by only looking at how behavior is influenced by attitudes very closely or directly related to that behavior. They do not account for the fact that this one behavioral decision is set in a context of numerous other options, behaviors, and attitudes and that one individual with all of these numerous options, behaviors, and attitudes, is set within a context of numerous other individuals, organizations, and social structures that influence the individual's decision-making. My research provides evidence supporting the idea that we need to expand sociological research to include the multiple social-psychological factors such as the individual's other options, behaviors, and attitudes. Additionally, future sociological research should focus on how the attitudes of others influence the attitudes and behaviors of the individual. This work would bring together theories and research on how social context influences the self and on how the self is created.

Second, these results also provide evidence that contraceptive method choice is a complex, little understood choice. Much has been made in the literature regarding the effects of access on method choice (Entwisle et al. 1996; Entwisle et al. 1997). However, these results provide little consistent evidence that perceptions of method accessibility were related to subsequent method choice. Also, although the results did show some amount of pushing and pulling towards specific methods—i.e. women who thought Depo-Provera had unpleasant side effects had lower rates of using that method and higher rates of using another method—these findings were not consistent across methods or

across attitude domains (side effects, accessibility, and effectiveness). Because not all methods are equally effective at preventing pregnancy or sexually transmitted disease transmission, additional research on method choice taking this wide view of influential factors may be particularly important.

Third, the attitudes I investigate here about children and family are important not just for what they tell us about individual level decision-making processes, but also for what they reveal about the process through which social change occurs. Substantively, as a group, the attitudes about children and family presented in this chapter attempt to capture the respondent's attitude toward new ideas. In Chapter 3 I illustrated how, historically in Nepal women were much more likely to agree with the measures of attitudes about children and family presented in this chapter—women born in more recent cohorts are more likely to hold the attitudes that correspond with higher rates of contraceptive use (Figures 3.8 to 3.11). That is, in this setting, disagreeing with these attitude statements was more common among younger women and represents new or innovative attitudes that correspond with engaging in innovative behavior, specifically using contraception. Furthermore, this relationship between holding innovative attitudes and later adopting an innovative behavior is independent of perceptions of access to contraception and other similar attitudes that are commonly cited as influencing contraceptive use and independent of other individual and community characteristics that could create or influence the attitudes. I now turn to explicit models of the relationship between health services, schools, attitudes, and contraceptive use to provide more information on this complex relationship.

Table 5.1 Descriptive Statistics, Attitude Measures

	Mean	SD	Min	Max
Contraception				
General				
Do you believe it is sinful to use contraception?	0.13		0	1
A vasectomized man cannot be blessed by God.	0.34		0	1
Everyone should use contraception/family planning.	0.81		0	1
It is wrong to use contraceptives or other means to avoid or delay pregnancy.	0.53		0	1
Side effects: Does method have unpleasant side effects? (0=no, 1=don't know, 2=yes)				
A vasectomy	0.82	0.89	0	2
Female sterilization	1.11	0.92	0	2
Depo-provera	1.15	0.88	0	2
Oral contraceptive pills	1.30	0.83	0	2
Condoms	0.83	0.86	0	2
Effectiveness: Is method effective in preventing pregnancy (0=no, 1=don't know, 2=yes)				
A vasectomy	1.67	0.65	0	2
Female sterilization	1.39	0.85	0	2
Depo-provera	1.31	0.84	0	2
Oral contraceptive pills	1.22	0.85	0	2
Condoms	1.31	0.84	0	2
Accessability: Is method easy or difficult to get? (0=difficult, 1=don't know, 2=easy)				
A vasectomy	1.46	0.84	0	2
Female sterilization	0.81	0.93	0	2
Depo-provera	1.46	0.81	0	2
Oral contraceptive pills	1.44	0.81	0	2
Condoms	1.65	0.68	0	2
Family size				
Ideal family size-Coombs scale	6.07	1.83	1	11
Gender preference scale	2.40	0.95	1	4
Children and family				
Men who do not have children cannot go to heaven.	0.27		0	1
To be an infertile woman is the same as not having a life.	0.97		0	1
It is better to have many children than to be rich.	0.28		0	1
Some people think that having many children would help parents do their work.	0.33		0	1
It is better to have no children than to have a child who marries a spouse of a different caste.	0.54		0	1
Non-family behaviors				
How important is it to you that a son of yours goes to college?	2.92	0.33	1	3
How important is it to you that a daughter of yours goes to college?	2.84	0.48	1	3
How important is it to you that your son finds a good paying job?	2.66	0.58	1	3
How important is it to you that your daughter finds a good paying	2.56	0.64	1	3

N = 1,168 women

Table 5.2. Predicted Direction of the Effect Estimate For Attitudes On Any Contraceptive Use

	Predicted relationship with contraceptive use: effect estimate	Predicted relationship with contraceptive use: odds ratio
Contraception		
General		
Do you believe it is sinful to use contraception?	negative	<1
A vasectomized man cannot be blessed by God.	negative	<1
Everyone should use contraception/family planning.	positive	>1
It is wrong to use contraceptives or other means to avoid or delay pregnancy.	negative	<1
Side effects: Does method have unpleasant side effects? (0=no, 1=don't know, 2=yes)		
A vasectomy	negative	<1
Female sterilization	negative	<1
Depo-provera	negative	<1
Oral contraceptive pills	negative	<1
Condoms	negative	<1
Effectiveness: Is method effective in preventing pregnancy (0=no, 1=don't know, 2=yes)		
A vasectomy	positive	>1
Female sterilization	positive	>1
Depo-provera	positive	>1
Oral contraceptive pills	positive	>1
Condoms	positive	>1
Accessability: Is method easy or difficult to get? (0=difficult, 1=don't know, 2=easy)		
A vasectomy	positive	>1
Female sterilization	positive	>1
Depo-provera	positive	>1
Oral contraceptive pills	positive	>1
Condoms	positive	>1
Family size		
Ideal family size-Coombs scale	negative	<1
Gender preference scale	negative	<1
Children and family		
Men who do not have children cannot go to heaven.	negative	<1
To be an infertile woman is the same as not having a life.	negative	<1
It is better to have many children than to be rich.	negative	<1
Some people think that having many children would help parents do their work.	negative	<1
It is better to have no children than to have a child who marries a spouse of a different caste.	negative	<1
Non-family behaviors		
How important is it to you that a son of yours goes to college?	positive	>1
How important is it to you that a daughter of yours goes to college?	positive	>1
How important is it to you that your son finds a good paying job?	positive	>1
How important is it to you that your daughter finds a good paying job?	positive	>1

Table 5.3. Descriptive Statistics, Control Measures

	Mean	SD	Min	Max
Childhood, age 12 and earlier				
Index of non-family experiences	2.65	1.63	0	7
Index of community characteristics	3.88	1.44	0	5
Recent, age 12 to 1996				
Index of non-family experiences	2.34	1.42	0	6
Enrolled in school in 1996	0.22		0	1
Years attended school as of 1996	6.57	5.39	0	21
Index of community characteristics	2.91	2.11	0	8
Childbearing and contraceptive history				
Number of children born before 1996	1.71	2.06	0	10
Number of children died before 1996	0.16	0.49	0	4
Ever used contraception before start of hazard	0.22		0	1
Migration				
Ever moved before 1996	0.80		0	1

N=1,168 women

Table 5.4. Multilevel Hazard Model Estimates: Relationship between General Attitudes About Contraception and Any Contraceptive Use

	1	2	3	4
Attitudes				
Contraception				
Do you believe it is sinful to use contraception?	0.75*			
	(-2.14)			
A vasectomized man cannot be blessed by God.		1.08		
		(0.91)		
Everyone should use contraception/family planning.			1.33**	
			(2.58)	
It is wrong to use contraceptives or other means to avoid or delay pregnancy.				0.97
				(-0.33)
Controls[a]				
Childhood, age 12 and earlier				
Index of non-family experiences	0.96	0.96	0.97	0.97
	(-0.78)	(-0.74)	(-0.57)	(-0.72)
Index of community characteristics	1.03	1.03	1.02	1.02
	(0.75)	(0.82)	(0.66)	(0.67)
Recent, age 12 to 1996				
Index of non-family experiences	1	1	1.01	1
	(-0.06)	(0.01)	(0.11)	(0.04)
Years of schooling	1	1	1	1
	(-0.38)	(0.01)	(-0.32)	(-0.2)
Enrolled in school	1.24*	1.23*	1.26*	1.24*
	(1.71)	(1.68)	(1.84)	(1.73)
Index of community characteristics	1.08**	1.08**	1.08**	1.08**
	(2.47)	(2.57)	(2.56)	(2.6)
Childbearing and contraceptive history				
Total number of children born before 1996	1.11**	1.11**	1.1**	1.11**
	(2.81)	(2.84)	(2.62)	(2.8)
Total number of children died before 1996	1.04	1.03	1.04	1.03
	(0.42)	(0.28)	(0.39)	(0.26)
Ever used contraception before start of hazard	2.79***	2.83***	2.74***	2.81***
	(10.62)	(10.76)	(10.39)	(10.72)
Ever moved before 1996	0.85+	0.85+	0.85+	0.85+
	(-1.33)	(-1.36)	(-1.34)	(-1.41)
Family Background				
Father's education (ever went to school)	0.88	0.87	0.87	0.88
	(-1.35)	(-1.48)	(-1.51)	(-1.43)
Father's employment (ever had paid employment)	1.11+	1.12+	1.12+	1.12+
	(1.31)	(1.42)	(1.36)	(1.42)
Mother's education (ever went to school)	0.91	0.91	0.9	0.9
	(-0.66)	(-0.7)	(-0.72)	(-0.73)
Mother's children ever born	0.98	0.98	0.98	0.98+
	(-1.19)	(-1.25)	(-1.28)	(-1.36)
Parental contraceptive use (parents ever use)	1.02	1	1.01	1
	(0.17)	(-0.01)	(0.13)	(0.02)

(cont.)

Table 5.4. Multilevel Hazard Model Estimates: Relationship between General Attitudes About Contraception and Any Contraceptive Use

	1	2	3	4
Ethnicity[b]				
Low caste Hindu	1.05	1.04	1.04	1.02
	(0.35)	(0.25)	(0.29)	(0.12)
Newar	1.17	1.17	1.17	1.17
	(0.91)	(0.94)	(0.9)	(0.91)
Hill Tibeto-Burmese	1.23+	1.25*	1.22+	1.24+
	(1.57)	(1.67)	(1.53)	(1.63)
Terai Tibeto-Burmese	0.79*	0.78*	0.77*	0.78*
	(-1.72)	(-1.8)	(-1.92)	(-1.82)
Birth cohort[c]				
Born 1976-1972 (age 20-24 in 1996)	0.93	0.92	0.91	0.92
	(-0.61)	(-0.74)	(-0.83)	(-0.75)
Born 1971-1967 (age 25-29 in 1996)	0.65**	0.64**	0.64**	0.64**
	(-2.88)	(-2.97)	(-2.98)	(-2.99)
Born 1966-1952 (age 30-44 in 1996)	0.22***	0.22***	0.22***	0.21***
	(-7.5)	(-7.63)	(-7.57)	(-7.69)
ICC	0.10	0.10	0.09	0.10

[a]Also includes dummies for calendar month and year.

[b]Reference group is Upper Caste Hindu.

[c]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.5. Multilevel Hazard Model Estimates: Relationship between Attitudes About the Side Effects of Contraceptive Methods and Any Contraceptive Use[a]

	1	2	3	4	5
Attitudes about specific methods					
Does method have unpleasant side effects? (0=no, 1=DK, 2=yes)					
Vasectomy	0.88**				
	(-2.81)				
Female sterilization		0.99			
		(-0.15)			
Depo Provera (injection)			0.98		
			(-0.44)		
Birth control pills				0.94	
				(-1.26)	
Condoms					0.97
					(-0.59)
ICC	0.10	0.10	0.10	0.10	0.10

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.6. Multilevel Hazard Model Estimates: Relationship between Attitudes About Effectiveness of Contraceptive Methods and Any Contraceptive Use[a]

	1	2	3	4	5
Attitudes about specific methods					
Is method effective in preventing pregnancy? (0=no, 1=DK, 2=yes)					
Vasectomy	1.04				
	(0.61)				
Female sterilization		1.03			
		(0.71)			
Depo Provera (injection)			1.12**		
			(2.39)		
Birth control pills				1.09*	
				(1.86)	
Condoms					1.12*
					(2.29)
ICC	0.10	0.10	0.11	0.10	0.10

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.7. Multilevel Hazard Model Estimates: Relationship between Attitudes About Ease of Obtaining Contraceptive Methods and Any Contraceptive Use[a]

	1	2	3	4	5
Attitudes about specific methods					
Is method easy or difficult to get (0=difficult, 1=DK, 2=easy)					
Vasectomy	1.06				
	(1.25)				
Female sterilization		0.99			
		(-0.12)			
Depo Provera (injection)			1.17**		
			(3.03)		
Birth control pills				1.03	
				(0.52)	
Condoms					1.21**
					(2.9)
ICC	0.10	0.10	0.10	0.10	0.10

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.8. Multilevel Hazard Model Estimates: Relationship between Attitudes About Family Size and Composition and Any Contraceptive Use[a]

	1	2
Attitudes		
Family composition		
Coombs scale	1.01 (0.32)	
Coombs gender preference scale		0.98 (-0.39)
ICC	0.10	0.10

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.9. Multilevel Hazard Model Estimates: Relationship between Attitudes About Children and Family and Any Contraceptive Use[a]

	1	2	3	4	5
Attitudes					
Children and family					
Men who do not have children cannot go to heaven.	0.86+				
	(-1.63)				
To be infertile is the same as not having a life.		0.58**			
		(-2.44)			
It is better to have many children than to be rich.			0.73***		
			(-3.35)		
Some people think that having many children would help parents do their work.				0.85*	
				(-1.83)	
It is better to have no children than to have a child who marries a spouse of a different caste.					0.85*
					(-2.07)
ICC	0.11	0.10	0.11	0.10	0.10

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.10. Multilevel Hazard Model Estimates: Relationship between Attitudes About Non-Family Behaviors and Any Contraceptive Use[a]

	1	2	3	4
Attitudes				
Non-family behaviors				
How important is it to you that a son of yours goes to college?	1.28* (1.84)			
How important is it to you that a daughter of yours goes to college?		1.03 (0.29)		
How important is it to you that your son find a good paying job?			1.11+ (1.45)	
How important is it to you that your daughter find a good paying job?				1.03 (0.47)
ICC	0.10	0.10	0.09	0.10

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.11. Multilevel Hazard Model Estimates: Independent Effects of Attitudes On The Hazard of Any Contraceptive Use[a]

	1	2	3	4	5
Attitudes					
Contraception					
Do you believe it is sinful to use contraception?	0.76*				0.83+
	(-1.95)				(-1.35)
Everyone should use contraception/family planning.	1.31**				1.26*
	(2.4)				(1.97)
Attitudes about specific methods					
Does method have unpleasant side effects? (0=no, 1=DK, 2=yes)					
Vasectomy		0.89**			0.9*
		(-2.41)			(-2.2)
Is method effective in preventing pregnancy? (0=no, 1=DK, 2=yes)					
Depo Provera (injection)		1.08+			1.09+
		(1.36)			(1.47)
Birth control pills		1.01			0.99
		(0.19)			(-0.09)
Condoms		1.03			1
		(0.51)			(-0.04)
Is method easy or difficult to get (0=difficult, 1=DK, 2=easy)					
Depo Provera (injection)		1.07			1.07
		(1.18)			(1.19)
Condoms		1.15*			1.13+
		(1.85)			(1.6)
Children and family					
Men who do not have children cannot go to heaven.			0.94		0.97
			(-0.67)		(-0.27)
To be infertile is the same as not having a life.			0.63*		0.57**
			(-2.03)		(-2.45)
It is better to have many children than to be rich.			0.76**		0.78**
			(-2.84)		(-2.58)
Some people think that having many children would help parents do their work.			0.91		0.91
			(-1.1)		(-0.98)
It is better to have no children than to have a child who marries a spouse of a different caste.			0.89+		0.88+
			(-1.46)		(-1.5)
Non-family behaviors					
How important is it to you that a son of yours goes to college?				1.25+	1.23+
				(1.61)	(1.46)
How important is it to you that your son find a good job?				1.09	1.07
				(1.18)	(0.89)
ICC	0.10	0.11	0.12	0.10	0.12

[a]Includes all controls described in text. They are not presented here for parsimony.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 5.12. Multilevel Hazard Model Estimates: Independent Effects of Attitudes On The Hazards of Specific Contraceptive Method Use[a]

	Sterilization	Depo-Provera	Pills	Condoms
	1	2	3	4
Attitudes about contraceptioin				
It is sinful to use contraception	0.67*	0.79		
	(-1.65)	(-1.21)		
A vasectomized man cannot be blessed by God.		1.22*	1.76***	
		(1.68)	(3.89)	
Everyone should use contraception/family planning.	1.39+		1.59**	
	(1.6)		(2.35)	
It is wrong to use contraceptives or other means to avoid or delay pregnancy.				0.72*
				(-2.17)
Attitudes about specific methods				
Does method have unpleasant side effects? (0=no, 1=DK, 2=yes)				
Vasectomy		0.85**		0.89
		(-2.55)		(-1.27)
Depo Provera (injection)	1.26*	0.93		
	(1.67)	(-1.08)		
Condoms				0.88+
				(-1.31)
Is method effective in preventing pregnancy? (0=no, 1=DK, 2=yes)				
Female sterilization		1.01	0.78***	
		(0.22)	(-3.22)	
Depo Provera (injection)		1.24**		
		(2.85)		
Birth control pills			1.15*	
			(1.67)	
Condoms	1.14			
	(1.14)			
Is method easy or difficult to get (0=difficult, 1=DK, 2=easy)				
Depo Provera (injection)		1.14+		
		(1.63)		
Condoms		1.19*	1.45**	
		(1.78)	(2.92)	
Family composition				
Coombs gender preference scale				0.88+
				(-1.5)
Children and family				
Men who do not have children cannot go to heaven.	0.85			0.81
	(-1.02)			(-1.09)
To be infertile is the same as not having a life.		0.45**		
		(-2.87)		
It is better to have no children than to have a child who marries a spouse of a different caste.	0.92		0.62**	0.67*
	(-0.58)		(-2.93)	(-1.92)
Some people think that having many children would help parents do their work.				0.78+
				(-1.36)
It is better to have many children than to be rich.		0.81*		
		(-1.65)		
Non-family behaviors				
How important is it to you that a daughter of yours goes to college?				1.3
				(0.46)
How important is it to you that a daughter of yours goes to college?				2.56*
				(2.16)
How important is it to you that your son find a good paying job?			1.16	1.16
			(1.22)	(1.01)
ICC	0.28	0.28	0.53	0.60

[a]Models include all control measures. + p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

CHAPTER 6

HEALTH SERVICES, ATTITUDES ABOUT CHILDREN, AND CONTRACEPTIVE USE

Introduction

This chapter focuses on the complex relationship between health services, attitudes about children, and contraceptive use. Despite a vast body of literature exploring the relationship between health services and individuals' fertility behavior, the specific mechanisms linking them have remained elusive. By investigating the relationship between specific dimensions of health services, individuals' attitudes regarding children and childbearing, and individuals' contraceptive behavior this chapter helps illuminate those mechanisms.

This chapter advances our understanding of these mechanisms in four ways. First, I apply a new theoretical framework to illustrate how specific dimensions of health services affect attitudes and behavior thereby revealing potential programmatic and social-psychological mechanisms. Second, by empirically examining the relationship between health services and attitudes I provide new information on the social-psychological mechanisms through which social context influences individual behavior. Third, I investigate the relationship between general attitudes about children and childbearing and a distant but related behavior, contraceptive use. Although there has been considerable evidence supporting the link between a specific attitude and a closely

related behavior (i.e. whether using contraception is acceptable and actual contraceptive use), little evidence has documented the role attitudes in other domains may play in an individual's fertility decision-making. Fourth, I empirically test this new theoretical framework in an ideal setting currently undergoing dramatic social change: rural Nepal.

The research presented here has three main components: the relationship between health services and behavior; between health services and attitudes; and between attitudes and behavior. In Chapter 2 I introduced the framework I use to guide this research. Here I provide a more detailed discussion explicitly incorporating specific health services and attitudes about children into this framework. I begin with a discussion of the theoretical link between attitudes and behavior and then discuss how health services influence both attitudes and behaviors.

Linking attitudes to contraceptive use

One long-standing theoretical line in demography and economics holds that much of this benefit comes from children's contribution to household production (Becker 1991; Becker and Lewis 1973; Cain 1983; Easterlin and Crimmins 1985; Willis 1973). Couples have many children because children decrease the workload for other family members or increase the overall production of the household (Cain 1977). When women believe that children help their parents with their work they see greater benefits to having children and are therefore less likely to use contraception.

Theoretical and empirical research illustrate that the benefits of childbearing may also come from non-economic considerations (Bulatao and Lee 1983; Edin and Kefalas 2005; Hoffman and Hoffman 1973; Hoffman, Thornton, and Manis 1978). In addition to immediate economic gains from the children's economic productivity or contribution,

parents may gain long-term economic stability from their children or they may see religious or cultural benefits to having children (McGarry and Schoeni 1997; Bennett 1983). Parents may choose to have children to ensure that someone will care for them in their old age, weighing the future benefit of old age care more than any current costs of childbearing. Also, when social norms are highly pro-childbearing, individuals and couples may believe that having children is important and beneficial, irrespective of the economic value of children. In societies where a woman's social status is determined at least partly by her fertility, couples may choose to have children despite it not being economically advantageous. Because they see greater benefits from having children, couples who believe it is wrong to be childless or who believe that children should care for their aging parents are less likely to use contraception or will use it later. This lack of or delayed contraceptive use will ensure large enough families to obtain these childbearing goals.

Linking health services to attitudes and behavior

I now turn to a discussion of how exposure to various dimensions of health services may influence attitudes and behavior related to contraceptive use. The protective content of experiences with health services generally affects the lives of individuals by improving their health and well-being. The consequences of the spread of health services are potentially numerous, including increased life expectancy, quality of life, and economic productivity (Berkowitz and Johnson 1974; Entwisle et al. 1997; Muhuri 1995; Orubuloye and Caldwell 1975; Sastry 1996). Thus, new health services constitute a substantial and wide-ranging form of social change.

The theoretical framework laid out in Chapter 2 illustrates how social change, or specifically increased exposure to non-family organizations, may influence a whole host of attitudes and behaviors. Health services may influence all aspects of the contraceptive use decision-making process—the true costs and benefits of contraceptive use and childbearing, individuals' assessment of those costs and benefits, and attitudes that may condition that assessment. As individuals have increasing exposure to health services they are also increasingly exposed to new ideas and behaviors. Therefore, I expect that in addition to the health and well-being improvements that result from a growing health service infrastructure, attitudes about children and childbearing will change as will contraceptive use behavior.

The health services themselves may provide new information that may influence an individual's assessment of the benefits and the social, psychological, and economic costs of children and contraceptive use. Even without providing explicit information about childbearing or contraceptive use health services may influence attitudes and subsequent behavior because they are a type of non-family organization. Health service providers may be seen as potential employers, thereby altering individuals' assessment of the relative costs and benefits of children versus other options such as education or work to be less in favor of childbearing. Providers may also be a sign or a symbol that serves to remind individuals that there may be other non-family organizations in the community, which would also alter this assessment towards non-family behaviors and contraceptive use. Additionally, as the number of providers and the type of services they offer increase, women will have more opportunity to interact with others who have received health services. This will further increase the exposure women have to new ideas and examples

of innovative behavior. Evidence from previous research demonstrates that health services do influence fertility behaviors (Brauner-Otto et al. Forthcoming; Entwisle et al. 1996; Entwisle et al. 1997; Freedman and Takeshita 1969; Knodel et al. 1987). The results presented here will provide new information regarding the specific mechanisms that lead to this observed relationship, notably the degree to which ideational factors may serve this role.

The theoretical framework presented in Chapter 2 illustrates that attitudes may be one of many potential mechanisms at work. In the sections below, I discuss the potential programmatic mechanisms through which various health services may influence attitudes about children and contraceptive use behavior. The below discussion will also show that health services may influence contraceptive use through other mechanisms such as child mortality or by meeting unmet need for contraception (Casterline and Sinding 2000; Sandberg 2002, 2006).

Family planning services. One mechanism through which health service providers may influence attitudes about children and contraceptive use behavior is by providing family planning services. As early as the 1960s extensive evidence demonstrated that organized family planning programs had substantial influence on couples' childbearing behavior, particularly in terms of contraceptive use and choice of effective methods (Angeles, Guilkey, and Mroz 1998; Entwisle et al. 1996; Freedman and Takeshita 1969; Koenig et al. 1987; Phillips et al. 1982). The increasing provision of family planning services may influence barriers such as lack of information and social pressures to avoid using modern methods. As these services become more available the time and financial costs of obtaining methods decreases. The increased presence of contraceptive methods

in the community may also lower women's assessment of the costs of using contraceptives. They may learn that a method does not have the negative side effects they previously attributed to it. The growth of services in an area may also help to spread information about contraceptives, addressing women's concerns about potential side effects from specific methods and reducing social pressure against the use of contraceptives (Mason 1987, 2001; Palmore and Freedman 1969; Stash 1999). Community norms against the use of contraception may decrease as they become more commonplace and as individuals learn more about them.

The spread of health services may also influence women's attitudes because, in addition to providing information on effective contraceptive use, the provision of family planning services often includes information that may change individuals' ideas about children. For instance, family planning motivation programs often include information on the "benefit of small families" and delayed or limited childbearing.

Consequently, I expect the increase in the availability of family planning services to influence attitudes about children and childbearing through the provision of methods and the services that generally accompany method prescription or sale. Specifically, I expect that women exposed to an increase in the availability of family planning services will be more likely to hold attitudes more favorable to contraceptive use such as placing less importance on childbearing or on the role of children within the family. In turn, these attitudes will result in a lower assessment of the costs of contraceptive use and subsequent higher actual contraceptive use.

Child health services. A second mechanism through which health service providers may influence attitudes about children and contraceptive use behavior is by

providing child health services. Child health services have been promoted as an important influence on fertility related behaviors because they decrease child mortality (Caldwell 1986; Foster 1984; Muhuri 1995; Orubuloye and Caldwell 1975; Pebley 1984). As the research community learned more about individuals' and couples' motivations to have many children, high levels of infant and child mortality were identified as substantial obstacles to the spread of fertility limitation (Bulatao and Lee 1983; Freedman 1987; Lloyd and Ivanov 1988; Mason 1997). In the face of this high mortality, couples wanted many children to insure achievement of their minimum desired family size (Bongaarts and Menken 1983; Chen 1983). If mortality was reduced, couples could achieve their desired family size by having fewer children. These observations led to a proliferation of child health services aimed at keeping young children healthy, lowering infant and child mortality, and thereby reducing the benefits of continued childbearing and increasing the benefits of contraceptive use. By reducing the need to have many children, child health services were believed to complete the link between lower child mortality and increased fertility limitation. In fact, the empirical evidence is consistent with the expectation that child health services do reduce infant and child mortality and increase contraceptive use (Brauner-Otto et al. Forthcoming; Caldwell 1986; Foster 1984; Muhuri 1995; Pebley 1984). Also, it is possible that child health services will influence attitudes about children regardless of their effect on actual child mortality and morbidity. A growing body of evidence indicates that it is parental perceptions of health and mortality risk, not the actual risk, that are a key influence on their childbearing decisions (Mason 1997; Montgomery 2000; Sandberg 2005, 2006).

Furthermore, individuals may adjust their attitudes about children and family in response to lowered actual or perceived mortality, which would also increase the benefits of using contraception and actual contraceptive use. For instance, individuals may change their assessment of the relative benefits of children versus other goods. When many more children are surviving the additional labor or other benefits they provide to the household may not be more than their costs.

An increase in the availability of child health services may also influence individuals' attitudes about the role of children and of childhood. With the spread of child health services comes an increase in the discourse on investing in children and devoting resources to their health and well-being. Consequently, children may start to be viewed as an opportunity for investment as opposed to being seen for their contributions to the household (Caldwell 1982; Caldwell, Reddy, and Caldwell 1985). At the same time, as child health services spread, individuals, especially mothers, will have more and more interactions occurring outside the family, exposing them to new ideas about children and the family. They are more likely to encounter people with less family oriented beliefs and attitudes such as thinking that the benefits from other options outweigh those of having children, that childbearing is not a necessary option for a fulfilled life, or that children should not be beholden to the family throughout their lives. Consequently, I expect that an increase in the exposure to child health services is related to less family oriented attitudes about children. These less family-oriented attitudes will lower the assessment of the costs of contraceptive use, resulting in increased actual use.

Maternal health services. A third mechanism through which health service providers may influence attitudes about children and contraceptive use behavior is by

providing maternal health services. Just as child health services influence attitudes and contraceptive use partly through their effect on child mortality, maternal health services are also important partly due to their effect on maternal health (Koenig et al. 1998; Frankenberg and Thomas 2001). The family unit is less stable when there are high rates and levels of maternal mortality. In this case, having many children may be seen as insurance that there will be surviving family members to carry out the necessary economic, social, cultural, and emotional functions of a family.

Additionally, maternal health services may influence attitudes about women and their roles within the family and society, much as child health services influence attitudes about children. Increasing exposure to maternal health services may influence individuals to not limit the roles of women to childbearing and other family functions. The growing investment in women's health may pave the way for new ideas about the importance of childbearing for women—specifically that it is acceptable to remain childless. Health services that convey the risks of childbearing or that provide information regarding the causes of infertility may also increase acceptance of childlessness. Similar to the effect of the provision of child health services, increased exposure to maternal health services may also have widespread impacts on attitudes and contraceptive use because they will expose women to new ideas about children and other life options thereby changing their assessment of the relative financial, social, and psychological costs and benefits of having children. In summary, health services are one example of the type of non-family institution theoretically and empirically found to be related to more individualistic and less family oriented beliefs and behaviors.

Spatial distribution of health services. When thinking about how health services influence behavior, both through experiences with and exposure to health services, it is important to remember that health services, like many features of social context, are generally associated with a specific place, and as they spread and improve, the distribution of these services across physical space changes. Because indirect exposure to health services is important (as opposed to simply experiences with health services), and because the realm of influence for health services is not limited to one specific location, when talking about the relationship between the increase in health services and attitudes about children and contraceptive use behavior it is important to investigate the influence of the entire health service context an individual is exposed to.

Data and Methods

Data

The data used here are described in detail in Chapter 4.

Analysis sample. The analysis sample for this chapter is the 1,252 women aged 15-44, married by 2006, not sterilized before the start of the hazard, and not missing data for any of the variables included in these analyses.

Measures

Contraceptive use.

This chapter focuses on the use of any contraception. I chose any contraceptive use as opposed to the use of specific contraceptive methods for two reasons. First, because my theory is about the adoption of an innovative behavior generally, and I have no theory as to why the use of one type of method may be more or less innovative than the use of another, there is no theoretical reason to disaggregate contraceptive use.

Second, because this chapter focuses on broad attitudes about children, and not attitudes germane to any one specific contraceptive method I only model the hazard of any contraceptive use. The measure is described in detail in Chapter 4.

Attitudes.

I look at three measures that capture different aspects of attitudes about children relevant for individuals' contraceptive use decision making. The first measure attempts to capture the respondent's assessment of the immediate benefits of children. Respondents were asked: "Some people think that having many children would help parents do their work. Do you strongly agree, somewhat agree, or don't agree at all?" I recoded this measure into a dichotomous measure equal to 1 if respondents strongly agree and 0 otherwise so that this variable equals one if the respondent thinks that children are helpful to their parents and 0 if they report that children are not helpful. Table 6.1 presents descriptive statistics for this measure and for all the other individual level measures in these analyses. Thirty-three percent of women in my sample felt that having many children would help parents do their work (Table 6.1).

(Table 6.1, about here)

The second attitude measure attempts to capture the respondent's assessment of the long-term benefits of children. Respondents were asked: "Some people think that a married son should live with his parents in their older age. Do you strongly agree, agree, disagree, or strongly disagree?" I recoded this measure such that respondents who said they strongly agree or agree are coded as 1 and those who disagree or strongly disagree are coded as 0. Eight-seven percent of respondents felt that a son should live with his parents.

The third attitude measure attempts to capture the respondent's general attitude regarding the importance of children and childbearing. Respondents were asked whether they strongly agree, agree, disagree, or strongly disagree with the following statement: "To be an infertile woman is the same as not having a life." I recoded this measure such that those who strongly agree, agree, or disagree are coded as 1 and those who strongly disagree are coded as 0. Ninety-seven percent of respondents are coded 1 for this measure.

Health services.

I created three measures to capture separate aspects of the health service context: family planning services (the provision of contraceptive methods), child health services (the provision of oral rehydration therapy), and maternal health services (the provision of prenatal services). All three measures capture both the provision of medical services, treatments, or medications and the dispersal of information.[21] Following the substantial body of literature examining the effect one's closest health service provider has on one's behavior, the first set of health service measures I investigate measure the availability of these three services from the respondent's closest provider. Also, because the theoretical framework discussed above refers to how an increase in services is a key component of the effect of health services on the individual, these measures also incorporate temporal change in health service availability.

The measures of the closest provider capture the change in availability for each of the three types of health services at the provider closest to the respondent in 1994 and in 1970. The choice of reference year, 1970, is to some degree arbitrary. Theoretically, it seemed important to incorporate as much change over the individuals' lives into the

[21] It is not possible to separate the effects of information versus service provision in these data.

measures as possible. I chose 1970 as the base year of reference because it was the first year that all three of the health services were available within the study area. This would allow the measures to incorporate the greatest amount of change in their values (for a detailed description of the pace of change in the availability of health services see Chapter 3 of this dissertation). I tested the sensitivity of the results presented below to alternative base years and found similar results. The second year, 1994, was the year before the individual survey was collected—that is, before the measures of respondents' attitudes were ascertained and before the prospective contraceptive use data was collected.[22] This change measure allows me to investigate the relationship between a change in health services on individuals' later contraceptive use behavior.

The distributions of these measures are presented in Table 6.2. As you can see, some women have negative values for these measures. This means that their closest provider in 1970 offered the specific service, but in 1994 their closest provider did not offer that service. This could arise from two different possibilities—the same health service provider may have stopped offering the specific service or a new provider was built closer to the woman's neighborhood and this new provider does not offer the service. In this second instance the 1970 provider may still be offering the service. This should highlight another important reason for expanding our empirical research beyond the aspect of social context nearest to the individual. The newer, closer health service provider may in fact not be the most important provider to someone who has been visiting another one that is farther away. Note: because distance to health services is

[22] There is some complication when ensuring temporal ordering because these Nepalese calendar starts in mid-April and some information in the data refers to the Nepalese year and some to the U.S. year. To ensure that the correct temporal ordering is accounted for I include an extra year in the lag between variables.

measured from the neighborhood center all of the health service measures are at the neighborhood level.[23]

(Table 6.2, about here)

As discussed above, when considering the effect of health services on individual behavior it is important to consider all the health services that may influence an individual. Consequently, the second set of measures of health services I use in these analyses incorporate information from all the providers that ever existed in this study area capturing the spatial variation in the distribution of health services. For all three aspects I create geographically weighted measures of the change in health service availability which can be represented as:

$$S^{*}_{cn} = \sum_{h=1}^{113} \left(\frac{S_{ch1994}}{W_{hn}} - \frac{S_{ch1970}}{W_{hn}} \right) \qquad \text{(equation 6.1)}$$

where S^{*}_{cn} is the geographically-weighted service *c* (e.g. oral rehydration therapy) for neighborhood *n*, S_{ch1994} is service *c* offered by provider *h* in the year 1994, S_{ch1970} is service *c* offered by provider *h* in 1970, and W_{hn} is the weight for provider *h* and neighborhood *n*. Because previous research and the theoretical framework described above predict that health services farther away will have less of an influence than those closer to the individual, I define W_{hn} as the natural log of the distance between provider *h* and neighborhood *n* (Buor 2002, 2003; Downey 2006). Previous research with these data found this specification of the distance decay function to best fit the data (Brauner-Otto et al. Forthcoming). The summation over 113 health service providers is because that is the

[23] Because neighborhoods in this study are small by definition (clusters of 5-15 households) these distances actually represent the distance individuals experience.

total number of health service providers that ever existed in Chitwan. The distributions at the health service level for these measures are also presented in Table 6.2.[24]

Controls.

I also include measures of characteristics that may influence the likelihood of living near certain health services, attitudes, and contraceptive use. Several of these controls—family background, ethnicity, and birth cohort—are described in Chapter 4 and descriptive statistics are presented in Table 4.1.

I include a measure of childhood community context in the analysis because it is strongly associated with contraceptive use in this setting (Axinn and Yabiku 2001). Respondent's reported whether there was a school, employer, market, or bus transportation within an hours walk from the respondent's neighborhood before age 12. Following previous research I created four separate dummy variables for each of the four services. Each dummy is equal to one if the service was available within an hours walk. I then summed the four measures to create an index of childhood community context. This measure is created from information in the retrospective individual survey interview and it is explicitly designed to capture the strongest possible effect of childhood community context documented in previous research using these data (Axinn and Yabiku 2001). The mean number of non-family organizations in a respondent's childhood community was just over 3 (see Table 6.1).

Health services are often built in conjunction with or in close proximity to other community services that may have similar influence on attitudes and behavior (Axinn and

[24] I also tested models that looked at measures of the geographically weighted distribution of each health service in 1995, 1994, and 1993 that were not change measures. The results were substantively identical to those in the models presented here. Because the theoretical framework is about increased exposure to non-family organizations I believe the change measure is a more appropriate measure of this conceptualization and therefore present those results in the tables below.

Yabiku 2001; Casterline 1985; Gertler and Molyneaux 1994; Hernandez 1981). Schools are of particular concern because there is some reason to believe that the spread of schools actually produces the increased availability of health services (Caldwell 1986). If this is true, then access to schools may in fact lead to subsequent changes in health services. Consequently, I include a measure of access to schools in all the models presented here. This measure equals 1 if the respondent had a school within a five minute walk in 1996.[25] Previous research has found a 5 minute walking radius to be the appropriate measure in this setting (Axinn and Yabiku 2001). I use 1996 as the reference year throughout this chapter because it is the last year for which this information is available.[26] Forty-nine percent of women had a school within a five minute walk in 1996 (see Table 6.1). This measure is measured at the neighborhood level—distance was measured between the neighborhood center and the school. However, I present the descriptive statistics as an individual level variable for ease of interpretation.

Individual's early non-family experiences may also influence the individual's choice in community later in life, attitudes, and contraceptive use behavior (i.e. individual's who had used health services early in life may be more likely to seek out communities with health services nearby). I use information gathered on the Life History

[25] I also explored other measures of 1996 community context that included measures of markets, employers, bus stops, and movie halls. Although the point estimate for the key independent variables remained unchanged the standard errors did go up (although the measures were still significant at the .05 level). Because the theoretical argument for controlling for other aspects of the community when estimating models of the effects of health services is largely based on the above described potential effect of schools I present those models which include only this control.

[26] Because of potential conflicts regarding temporal ordering I also tested control measures that referred 1992 and 1993—before the measures of attitudes were obtained and before the last year of health services measures. In virtually all instances there were no substantive differences between those models and those presented here where the controls refer to 1996. The exception concerns the controls for previous contraceptive use described later. If I do not control for the respondent's contraceptive use during the time immediately before the start of the hazard (that is for the period between the 1996 interview and the start of the prospective data collection, February 1997) the effects of the attitude regarding sons caring for their parents are not statistically significant.

Calendars to create two measures of the individual's experiences with non-family organizations. The first measure is a dichotomous measure equal to one if the respondent had visited a health service before 1996 and zero otherwise.

Experiences with other non-family organizations may also influence attitudes and contraceptive use. Substantial bodies of literature provide evidence that education, work and living experiences, media exposure, and participation in groups are all related to family behaviors and attitudes (Axinn and Barber 2001; Axinn and Yabiku 2001; Barber and Axinn 2004; Barber et al. 2002; Caldwell 1982; Lloyd, Kaufman, and Hewett 2000; Thornton, Alwin, and Camburn 1983; Zajonc 1968). The second measure is an index measure of these other non-family experiences. For this measure I created seven dichotomous indicators each equal to one if the respondent had lived away from home, worked for pay, attended school, seen a movie, listened to the radio, or participated in a voluntary group or club before 1996 and zero otherwise.[27] I then sum the seven variables to create an index of the number of the individual's non-family experiences. Ninety-five percent of women had visited a health service provider and the mean number of other non-family experiences was just over 3 (Table 6.1).

I include three measures of marital and childbearing experiences in these models. The number of children a woman has given birth to and the number who have died are related to her likelihood of using contraceptives and also probably related to her attitudes about contraception and family. I create two count measures—one for the number of children the respondent reported giving birth to and one for the number she reported who had died, both by 1996. In the models of the relationship between health services and

[27] Groups refers to community based groups focusing on a variety of issues including women's issues, seed dispersion, micro-loans, and social activities.

attitudes I include a dummy variable equal to one if the respondent was married in 1996.[28]

To control for previous migration I create a dichotomous measure equal to 1 if the neighborhood the respondent was living in 1994, the reference year for the measures of health services, was different from her neighborhood in 1996, the year she was interviewed.

Finally, I control for previous contraceptive use. I created one dichotomous measure equal to one if the respondent had used contraception prior to the 1996 interview and one measure equal to one if she used a method after the 1996 interview, but before the beginning of the regularly collected monthly prospective data.[29]

Analytic Strategy

This chapter has four analytic goals: 1) to investigate the relationship between attitudes about children and contraceptive use behavior; 2) to investigate the relationship between health services and attitudes about children; 3) to investigate the relationship between health services and contraceptive use behavior; and 4) to examine the degree to which attitudes about children may be a mechanism through which health services effect contraceptive behavior. The specific estimation strategy is presented in detail in Chapter 4. Here I provide only a brief summary.

These four separate goals require two different analytic approaches based on whether the dependent variable is attitudes or contraceptive use. I describe both methods

[28] This measure is not necessary in the hazard models of contraceptive use because the hazard does not start until the respondent is married.

[29] As you can see in Table 6.1, 20 percent of women in this sample had used a method prior to the 1996 interview and 9 percent in the period between the interview and the start of the monthly prospective data collection. When I remove these women from the analysis sample and re-estimate the models the effects of health services on women's attitudes infertility are not statistically significant. All other effects are substantively the same as those presented in the tables below.

separately below, detailing first the strategy for analyzing models of the effects of health services on attitudes and then the strategy for models with contraceptive use behavior as the outcome. For consistency, I also present my results in the same order.

Models with attitudes about children as the dependent variable. The analyses of the effect of health services on attitudes about children focuses on one attitude measure at a time. Because I have recoded the attitude measures into dichotomous indicators I use multilevel logistic regression of the form:

$$\text{logit}\,(A_{in}) = \beta_0 + \boldsymbol{\beta}_1\mathbf{T}_{in} + \boldsymbol{\beta}_{2n}\mathbf{S}^{d}_{nt} \qquad \text{(equation 6.2)}^{30}$$

and

$$\boldsymbol{\beta}_{2n} = \beta_2 + \mu_{2n} \qquad \text{(equation 6.3)}$$

for individual i in neighborhood n, where A_{in} is a specific attitude for individual i in neighborhood n. Specifically, it is the odds that the respondent reported that having many children helps parents with their work, that a married son should live with his parents in their older age, and that being infertile is the same as not having a life. β_0 is the intercept, $\boldsymbol{\beta}_1$ is a vector of coefficients. $\mathbf{T}_{in}$ represents a vector of individual characteristics and controls for individual i in neighborhood n that may influence both an individual's exposure to health services and her attitudes. $\mathbf{S}^{d}_{nt}$ is a vector of neighborhood level variables that includes S^{*}_{cn} defined above in equation 6.1 in the relevant models and neighbourhood level controls. $\boldsymbol{\beta}_{2n}$ is the intercept for neighborhood n. In all the models presented in this dissertation it is a neighborhood level random coefficient. β_2 is the mean, or intercept, for all neighborhoods and μ_{2n} is the standard deviation, or random

[30] This is comparable to equations 4.1 and 4.2. In Chapter 4 these equations are not specific to using dichotomous measures of attitudes as they are here.

part, for each neighborhood. I use the *GLIMMIX* macro for SAS to estimate all multilevel random-effects logistic regressions in this chapter.

Of course no amount of care in the estimation will create random assignment of health services to places where it did not exist. Therefore the results I present below should be interpreted with reasonable caution regarding the nature of the true causal effects our estimates are designed to reflect. Nevertheless, the estimates are robust to a range of alternative specifications. In the context of this specific setting this is not surprising—in this part of Nepal the location of health services was generally determined by the central government and international assistance organizations with relatively little consideration of local community differences.

Models with contraceptive use as the dependent variable. As described in Chapter 4, I use discrete time methods to estimate multilevel event history models of the risk of using contraception. Person-months of exposure are the unit of analysis and I consider women to be at risk after they marry for the first time. The hazard starts at the first month of regular data collection in the prospective data for women married at this time and in the month after they marry for women who marry later.

The first set of models I analyze with this technique estimate the effect of attitudes about children on the hazard of contraceptive use. The specific form of the logistic regression is identical to that presented in Chapter 4, equations 4.3 and 4.4. The second set of event history models estimate the effect of health services on the hazard of contraceptive use. The specific form of these models is presented in equations 4.5 and 4.6. The final set of models I present are the full models that allow me to estimate the degree to which attitudes may be a mechanism through which health services influence

the hazard of contraceptive use. These are displayed in equations 4.7 and 4.8. The difference between the $\boldsymbol{\beta}_{2n}$ in equation 4.5 and the $\boldsymbol{\beta}_{2n}$ in equation 4.7 is equal to the indirect effects of $\mathbf{S}^{d}_{nt}$, health services, that influence contraceptive use through $\mathbf{A}_{in}$, attitudes. The remaining effects of $\mathbf{S}^{d}_{nt}$ in equation 4.7 are the more direct effects of the dimensions that do not operate through the attitudes included in $\mathbf{A}_{in}$.

Results

Health services and attitudes

Tables 6.3 through 6.5 present the estimates for models of the relationship between health services and attitudes about children. The coefficients displayed are the multiplicative effects on the odds of holding that attitude. An exponentiated coefficient greater than 1.00 represents a positive effect, less than 1.00 a negative effect, and equal to 1.00 no effect.

For each attitude measure I present the separate effects of the six health service measures—those of the change in availability of family planning methods, oral rehydration therapy, and prenatal care at the closest provider and the three geoweighted health service change measures. Table 6.3 shows the models of the relationship between these measures of health services and women's attitude regarding children's contribution to the household. Columns one through three show the models with the measures of the closest provider and columns four through six for the geoweighted measures of the all the services available. As you can see, the measures of change in service availability at the closest provider were not statistically significant.

In Models 4 through 6 we see that the geographically weighted measures of the change in service availability for the entire study area are statistically significantly related

to women's attitudes about children's contribution to the household. Women who experienced a greater change in service availability were less likely to agree with this statement. Specifically, women who experienced a one unit increase in the geographically weighted distribution of family planning services, oral rehydration therapy, or prenatal care had roughly 60 percent (1-0.36=.64) lower odds of saying that having many children is helpful or over 170 percent higher (1/0.36=2.78) odds of saying that having many children is *not* helpful to their parents. There are two ways a woman could experience this type of change. First, new services can be built that are closer to the respondent's neighborhood. Second, existing providers can begin offering a specific service. Because these measures incorporate both factors it is not possible from these analyses to determine which, if either, are driving these findings.

(Table 6.3, about here)

I do not believe we should be wary of the large odds ratios in these models because these measures represent a new way of conceptualizing the health service context, and their scale is different from how we typically measure health services. A one unit increase in the measure of the change in the geographically weighted measure of the change in the distribution of all the health services in the study area over time corresponds with a dramatic change in the health service context. For instance, if one additional health service located at either end of the study area provided family planning methods in 1994, the mean in the geoweighted distribution of family planning methods would only increase from 7.56 to 7.67. If the additional health service was located roughly one-third of the way into the study area the mean would increase to 7.68. If all of the health services located in one-third of the study area that were not offering family

planning methods in 1995 began to offer them, the mean for this variable would increase to 8.12. Consequently, it may be more realistic to think of the consequences of a .10 unit increase in the geoweighted change in exposure to family planning services, which is associated with a roughly 6 percent lower odds of disagreeing with the statement that having many children would help parents do their work. So, even when considering only a small increase in the geoweighted exposure to health services, these results show that increased exposure to multiple types of health services is related to significantly less family oriented attitudes for a range of attitudes about children.

Turning briefly to the control measures included in Table 6.3 we see several things of note. Women's own experiences with health services were also related to their attitudes about children's contribution to the household. Women who had visited a health service were less likely to think that having many children helps parents with their work. Married women were also less likely to agree with this statement, but childbearing experiences, previous contraceptive use, or parental characteristics were not significantly related. Surprisingly, younger women were more likely to agree with this statement than older women.

Tables 6.4 and 6.5 are similar to Table 6.3 except that they show the models of women's attitudes about sons caring for their parents and the importance of childbearing. Here we see similar results as in Table 6.3—only the measures of the geographically weighted service availability in the entire area were significantly related to these attitude measures. Women who were exposed to larger increases in the geographically weighted distribution of family planning, child, and maternal health services were less likely to

agree that a married son should live with his parents in their old age or that to be an infertile woman is the same as not having a life.

(Tables 6.4 and 6.5, about here)

There are several interesting differences in how the control measures were related to these attitudes. Having visited a health service was not related to either a woman's attitude about children caring for their elderly parents or about infertility. In Table 6.4 we see that women who had more children were actually less likely to agree that a married son should live with his parents, but childbearing was not related to the attitude measure about infertility. Interestingly, birth cohort was not statistically related to women's attitudes about children caring for their parents. There were strong effects of birth cohort on the attitude about infertility with younger women being more likely to agree that to be an infertile woman is the same as not having a life (Table 6.5). A final note about controls, women whose mother's went to school were less likely to agree with this statement about infertility and those whose mother's had more children were more likely to agree.

Attitudes and contraceptive use

In Table 6.6 I present the odds ratios from the multilevel hazard models of the relationship between attitudes about children and later contraceptive use behavior. Because the frequency of events, contraceptive use, in any one month interval is quite small, the odds of contraceptive use are very similar to the rate, and I discuss the results in terms of rates. Models 1 through 3 show the separate effects of each attitude on the hazard of contraceptive use. All three attitudes were negatively related to the hazard of contraceptive use—women who reported more family oriented attitudes about children

had lower rates of contraceptive use. Women who thought that children help parents with their work or that a son should care for his parents had rates of contraceptive use roughly 15 percent lower than those women who disagreed with these statements. Women who strongly disagreed with the statement that to be infertile is the same as not having a life had rates of contraceptive use 50 percent lower than other women.

(Table 6.6, about here)

Model 4 shows the independent effects when all three measures of attitudes are included in the same model. All three measures of attitudes maintain statistically independent effects in this model. That is, all three of these attitudes simultaneously and independently influence contraceptive use.

Turning briefly to the control measures we see that women who had visited a health service had much higher, over 100 percent higher, rates of contraceptive use than women who had not visited a health service. As expected, women with more children also had higher rates and women who came from larger families had lower rates of contraceptive use. In these models of contraceptive use birth cohort worked as expected with the youngest cohort having higher rates of contraceptive use than the older cohorts.

Health services and contraceptive use

In Table 6.7 I reintroduce the measures of change in availability of health services to the hazard models of contraceptive use and remove the attitude measures. All the models include the same controls as in Table 6.6—for parsimony I do not display them in this table. In models 1 through 3 we see that only the measure of change in the availability of prenatal services at the closest provider was related to the hazard of contraceptive use. Women whose closest health service provider offered prenatal services

in 1994 but not in 1970 had rates of contraceptive use 27 percent higher than women who experienced no change in the availability of prenatal services and 61 percent higher (1.29^2=1.61) than women whose closest health service provider offered prenatal services in 1970 but not in 1994.

(Table 6.7, about here)

In models 4 through 6 we again see a marked difference when we consider all of the health service providers in the area. All three of the geographically weighted measures of change in health service availability were positively and significantly related to the hazard of contraceptive use. Women who experienced more change in their geoweighted distribution of family planning, child, and maternal health services had higher rates of contraceptive use than women who experienced less change.

Health services, attitudes, and contraceptive use

Table 6.8 presents the models described by equations 4.7 and 4.8 and includes both the attitude measures from Table 6.6 and the geographically weighted health service measures from Table 6.7 (again, these also include all the same controls as shown in Table 6.6). The estimates shown are odds ratios from multilevel hazard models of the relationship between health services, attitudes about children, and the hazard of contraceptive use. I do not present results for the measures of service availability at the closest provider. Because none of the measures of the closest provider were significantly related to the attitudes in Tables 6.3 through 6.5., these analyses do not support the idea that attitudes about children are a mechanism through which health services at the closest provider influence contraceptive use behavior.

(Table 6.8, about here)

The important conclusion from the three models presented in this table actually comes from comparing these results with those presented in Table 6.7, Models 4-6. By examining the decrease in the odds ratios for the measures of health services from Table 6.7 when we include the attitude measures in we can assess whether attitudes are a mechanism through which various health services influence contraceptive use behavior. Looking at Table 6.8 Model 1 and Table 6.7 Model 4 we see that attitudes about children do appear to be a mechanism through which various family planning services influence contraceptive use behavior when we consider all the providers in the area. The odds ratio decreases by 12 percent when the attitude measures are added to the model. The odds ratios for the other two measures of the change in the geoweighted distribution of health services on the hazard of contraceptive use also decrease by about 12 percent when the measures of attitudes about children are included in the model (Table 6.8 Models 2-3 compared with Table 6.7, Models 5-6 respectively).

These are fairly large reductions in the odds ratios and there are several reason we might expect attitudes to account for an even larger percent of the effect of health services on contraceptive use. First, the three attitude measures presented in these analyses are simply examples of ways to capture these attitudes among individuals. There may be many other questions and statements that could be used to capture these same attitudes. Second, the theoretical framework I discuss above points to *many* different attitudes that may be relevant to contraceptive use. This chapter only examines attitudes about children, and only about very specific aspects of children. Third, these attitude measures only capture the wife's attitudes. It is likely that husband's, parents', and even

neighbors' attitudes also influence behavior and including them in the model would likely yield a larger decrease in the effect estimates for the measures of health services.

Discussion

Demographic research has long focused on the role health services play in influencing individual behavior. Substantial bodies of literature exist documenting the effect that provision of contraceptive services has on individual's contraceptive behavior (Freedman and Takeshita 1969; Knodel et al. 1987). Related research has addressed how access to those services may moderate their effect on individuals (Entwisle et al. 1996; Entwisle et al. 1997). However, far less research has gone beyond studying the direct relationship between contraceptive provision and use or beyond a simple definition of access as being a straight line distance (see Brauner-Otto et al. Forthcoming for an exception). The research presented in this chapter moves the literature forward in both respects.

The analyses presented here represent a new way of thinking about health services, access to services, and the effect of services on the individual. Theories of how social context influences the individual point to a range of pathways through which health services influence individuals—specifically to both experiences with and exposure to health services. However, empirical research has often been limited by data in its ability to expand its analyses of exposure effects. This paper makes an important contribution by conceptualizing and analyzing the role of health services in terms of the overall health context an individual is exposed to, and not limiting it to one specific provider. I consistently found that broader measures of exposure to family planning, child, and maternal health services were statistically related to both individuals' attitudes

about children and their contraceptive use behavior. Regarding the specific health services analyzed in this chapter, these findings provide evidence that multiple pathways may be at work. Increased exposure to family planning, child, and maternal health services may influence attitudes and behavior by providing new information about contraception, childbearing, or other alternatives for women which would change their assessment of the costs and benefits of contraceptive use. Child health services may also change the actual costs and benefits of childbearing—if more children are surviving, the benefit from additional children may be lower. These dramatic and consistent findings can be seen as positive support of this more inclusive, expansive conceptualization of the effects of health services specifically and social context in general. Although contextual features are almost always physically confined to one place, their influence is not similarly limited and as researchers we should explore new ways to measure and model access and the relationship between context and the individual.

The implications of this research for understanding how access to health services influences individuals is worth elaborating on briefly. A small, but growing, body of existing research looks at alternative measures of access to health services than simple distance to the nearest provider (Buor 2002; 2003; Entwisle et al. 1996; Entwisle et al. 1997; Frankenberg and Thomas 2001). That work is most certainly informative, but we should not think it is sufficient. The findings I present here remind the researcher that the effects of service providers extend far beyond their walls. Investigations into how these effects spread throughout space may be a fruitful avenue of future research. Research in the fields of network and spatial analysis are likely to be especially informing in this area.

Social psychological theories show that numerous factors influence individual behavior. Individuals' and community held attitudes and behaviors all influence individuals' assessment of the costs and benefits of contraceptive use. Additionally, attitudes and experiences not directly connected to a specific behavior may influence it. Yet, demographic research has not expanded to investigate these multiple causal pathways (see Barber 2001 and Plotnick 1992 for notable exceptions). The research presented here is an important contribution to both demographic and social psychological literatures because it expands previous demographic models to incorporate the numerous alternative causal influences predicted by social psychological frameworks. The results shown above provide important evidence regarding both the need to expand our previous conceptualizations of common demographic topics and the importance in looking to multiple theoretical frameworks in demographic research.

The analyses presented in this paper provide evidence that social psychological frameworks may be particularly fruitful in demographic research. Several different measures of individual's attitudes were significantly related to their contraceptive behavior. There are at least three important points to highlight here. First, these findings show that multiple attitudes are simultaneously and independently related to individual's contraceptive use. Second, these results constitute new evidence that attitudes are not just related to their most proximal behavior. These results show that ideas about childlessness, infertility, the relative value of children, and children's roles within the household all influence the rate of contraceptive use. Third, these results directly support both the social psychological and social change aspects of my theoretical framework. As women are increasingly exposed to important non-family organizations, their attitudes become

less focused on the family and more individualistic, and they have higher rates of modern contraceptive method use.

Perhaps the most important conclusion from the final set of analyses I present refers to my theoretical framework. Social theories of how macro-level characteristics influence the individual generally detail two potential pathways. On the one hand, changes in social context may allow individuals to act on previously held beliefs and change their behavior. For example, when contraceptives become more readily available people who previously wanted to use contraceptives but could not obtain them are now able to do so. On the other hand, changes in social context may change individual's ideas thereby resulting in observed behavioral changes (Caldwell 1982; Casterline 2001; Lesthaeghe and Surkyn 1988). The research presented here allows us the unique opportunity to differentiate between these two mechanisms. By explicitly testing the relationship between health services, attitudes that are known to influence contraceptive use, and actual contraceptive use rates I provide evidence that these pathways are working simultaneously. By showing that the small selection of attitude measures presented here decreases the effect of the change in the exposure to health services by 5 percent these findings illustrate that change in social context allows individual to act on previously held beliefs *and* is related to ideational change. Of course, the results presented here at not conclusive in anyway. But they do provide evidence of an ideological effect of social change.

Finally, I would like to remind the reader that the analyses presented here focused on only a few measures of health services and of one domain of wife's attitudes. Our understanding of extent to which health services directly influences contraceptive use as

opposed to indirectly through ideational change will be greatly improved by additional research that investigates other aspects of health services, other measures of these attitudes, and measures of other attitudes held by wives, husbands, and other people who may influence the couple's decision to use contraception. Additional research may provide valuable information on how attitudes are shaped in general and more specifically on how social context shapes them.

Table 6.1. Individual Level Descriptive Statistics

	Mean	SD	Min	Max
Attitudes				
Some people think that having many children would help parents do their work.	0.33		0	1
Some people think that a married son should live with his parents in their old age.	0.87		0	1
To be an infertile woman is the same as not having a life.	0.97		0	1
Controls				
Community characteristics				
Number of non-family organizations in childhood community (before age 12)	3.12	1.14	0	4
School within 5 minute walk in 1996	0.49		0	1
Non-family experiences before 1996				
Visited a health service provider	0.95		0	1
Number of other non-family experiences	3.19	0.95	0	7
Marital and childbearing history				
Total number of children born before 1996	1.74	2.09	0	10
Total number of children died before 1996	0.17	0.52	0	4
Married in 1996	0.79		0	1
In 1994 lived in same neighborhood as in 1996	0.81		0	1
Contraceptive history				
Used contraception after 1996 interview, but before 1st regular month of registry	0.09		0	1
Ever used contraception before 1996	0.21		0	1

Note: Descriptive statistics are for 1,252 women.

Table 6.2. Neighborhood Level Health Services Descriptive Statistics

	Mean	SD	Min	Max
Family planning methods offered				
Closest				
1970	0.25	0.44	0.00	1.00
1994	0.90	0.30	0.00	1.00
Difference	0.65	0.50	-1.00	1.00
Geographically weighted				
1970	0.23	0.02	0.20	0.30
1994	7.56	0.23	6.84	8.10
Difference	7.33	0.22	6.64	7.88
Oral rehydration therapy offered				
Closest				
1970	0.92	0.27	0.00	1.00
1994	0.95	0.22	0.00	1.00
Difference	0.02	0.24	-1.00	1.00
Geographically weighted				
1970	1.92	0.08	1.72	2.22
1994	9.03	0.30	8.14	9.71
Difference	7.10	0.22	6.42	7.58
Prenatal services offered				
Closest				
1970	0.96	0.18	0.00	1.00
1994	0.95	0.21	0.00	1.00
Difference	-0.01	0.29	-1.00	1.00
Geographically weighted				
1970	1.81	0.06	1.63	2.02
1994	8.69	0.28	7.84	9.38
Difference	6.87	0.22	6.21	7.40

N=171 neighborhoods.

Table 6.3. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

Some people think aving many children would help parents do their work.						
	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Health Services (difference between 1994 and 1970)						
Family planning methods	0.92 (-0.58)			0.36*** (-3.27)		
Oral rehydration therapy		1.07 (0.28)			0.37*** (-3.27)	
Prenatal care			1.03 (0.14)			0.36*** (-3.32)
Controls[a]						
Community characteristics						
Number of non-family organizations in childhood community (before age 12)	0.96 (-0.57)	0.96 (-0.65)	0.96 (-0.65)	0.95 (-0.75)	0.95 (-0.77)	0.95 (-0.75)
School within 5 minute walk in 1996	1.20 (1.39)	1.20 (1.43)	1.20 (1.43)	1.31 (2.04)	1.30 (1.97)	1.29 (1.95)
Non-family experiences before 1996						
Visited a health service provider	0.40*** (-3.21)	0.40*** (-3.23)	0.40*** (-3.22)	0.40*** (-3.23)	0.40*** (-3.23)	0.40*** (-3.22)
Number of other non-family experiences	0.91+ (-1.29)	0.91 (-1.27)	0.91 (-1.28)	0.93 (-0.89)	0.93 (-0.9)	0.93 (-0.9)
Marital and childbearing history						
Total number of children born before 1996	1.05 (0.87)	1.05 (0.82)	1.05 (0.84)	1.03 (0.52)	1.03 (0.5)	1.03 (0.5)
Total number of children died before 1996	0.95 (-0.37)	0.95 (-0.36)	0.95 (-0.37)	0.95 (-0.37)	0.95 (-0.35)	0.95 (-0.36)
Married in 1996	0.68* (-1.88)	0.68* (-1.89)	0.68* (-1.89)	0.67* (-1.92)	0.67* (-1.95)	0.67* (-1.95)

(cont.)

Table 6.3. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

Some people think aving many children would help parents do their work.	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Family Background						
Father's education (ever went to school)	0.85	0.85	0.85	0.87	0.87	0.87
	(-1.13)	(-1.11)	(-1.11)	(-0.94)	(-0.94)	(-0.94)
Father's employment (ever had paid employment)	1.39	1.38	1.38	1.41	1.41	1.41
	(2.41)	(2.38)	(2.38)	(2.5)	(2.49)	(2.51)
Mother's education (ever went to school)	1.38	1.38	1.38	1.44	1.43	1.44
	(1.45)	(1.45)	(1.44)	(1.63)	(1.61)	(1.63)
Mother's children ever born	1.03	1.03	1.03	1.03	1.03	1.03
	(1.04)	(1.07)	(1.06)	(1.04)	(1.06)	(1.05)
Parental contraceptive use (parents ever use)	0.9	0.9	0.9	0.91	0.9	0.91
	(-0.7)	(-0.68)	(-0.69)	(-0.66)	(-0.66)	(-0.65)
Ethnicity[b]						
Low caste Hindu	1.59*	1.61*	1.6*	1.66*	1.65*	1.66*
	(2.1)	(2.16)	(2.14)	(2.31)	(2.28)	(2.29)
Newar	1.35	1.36	1.35	1.51+	1.48+	1.49+
	(1.16)	(1.19)	(1.18)	(1.6)	(1.52)	(1.55)
Hill Tibeto-Burmese	1.2	1.22	1.22	1.16	1.17	1.17
	(0.89)	(1)	(0.99)	(0.75)	(0.77)	(0.77)
Terai Tibeto-Burmese	2.67***	2.68***	2.66***	2.34***	2.34***	2.34***
	(5.6)	(5.49)	(5.54)	(4.77)	(4.76)	(4.77)
Birth cohort[c]						
Born 1976-1972 (age 20-24 in 1996)	0.52***	0.52***	0.52***	0.54**	0.54**	0.54**
	(-3.24)	(-3.25)	(-3.25)	(-3.07)	(-3.04)	(-3.03)
Born 1971-1967 (age 25-29 in 1996)	0.64*	0.64*	0.64*	0.69+	0.69+	0.7+
	(-1.76)	(-1.73)	(-1.75)	(-1.45)	(-1.44)	(-1.42)
Born 1966-1952 (age 30-44 in 1996)	0.69+	0.7	0.69+	0.78	0.79	0.79
	(-1.29)	(-1.28)	(-1.3)	(-0.85)	(-0.84)	(-0.82)

(cont.)

Table 6.3. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

Some people think aving many children would help parents do their work.	Closest provider			All providers, geographically		
	1	2	3	4	5	6
In 1994 lived in same neighborhood as in 1996	1.01	1.02	1.02	0.98	0.97	0.97
	(0.06)	(0.1)	(0.11)	(-0.13)	(-0.15)	(-0.16)
Childbearing and contraceptive history						
Used contraception after 1996 interview, but before 1st regular month of registry	0.79	0.8	0.8	0.83	0.83	0.84
	(-1.15)	(-1.11)	(-1.13)	(-0.91)	(-0.9)	(-0.89)
Ever used contraception before 1996	0.92	0.93	0.93	0.95	0.95	0.95
	(-0.29)	(-0.27)	(-0.27)	(-0.18)	(-0.17)	(-0.17)
ICC	0.00	0.00	0.00	0.00	0.00	0.00
N	1252	1252	1252	1252	1252	1252

[a]Also includes dummies for calendar month and year.

[b]Reference group is Upper Caste Hindu.

[c]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 6.4. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

Some people think a married son should live with his parents in their old age.						
	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Health Services (difference between 1994 and 1970)						
Family planning methods	1.30 (1.41)			0.30** (-2.64)		
Oral rehydration therapy		0.8 (-0.73)			0.31** (-2.61)	
Prenatal care			0.71 (-1.21)			0.3** (-2.67)
Controls[a]						
Community characteristics						
Number of non-family organizations in childhood community (before age 12)	0.94 (-0.72)	0.95 (-0.56)	0.95 (-0.61)	0.94 (-0.68)	0.94 (-0.69)	0.94 (-0.68)
School within 5 minute walk in 1996	0.94 (-0.34)	0.93 (-0.43)	0.91 (-0.56)	1.02 (0.1)	1.01 (0.04)	1 (0.01)
Non-family experiences before 1996						
Visited a health service provider	1.19 (0.45)	1.22 (0.51)	1.19 (0.46)	1.23 (0.52)	1.22 (0.52)	1.23 (0.53)
Number of other non-family experiences	1.06 (0.53)	1.05 (0.47)	1.05 (0.5)	1.08 (0.75)	1.08 (0.74)	1.08 (0.74)
Marital and childbearing history						
Total number of children born before 1996	0.88* (-1.81)	0.89* (-1.69)	0.88* (-1.76)	0.86* (-2.05)	0.86* (-2.06)	0.86* (-2.07)
Total number of children died before 1996	1.25 (1.09)	1.24 (1.07)	1.25 (1.11)	1.25 (1.1)	1.25 (1.11)	1.25 (1.1)
Married in 1996	0.94 (-0.22)	0.95 (-0.17)	0.95 (-0.17)	0.93 (-0.23)	0.93 (-0.26)	0.93 (-0.25)

(cont.)

Table 6.4. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

Some people think a married son should live with his parents in their old age.	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Family Background						
Father's education (ever went to school)	0.74+	0.73+	0.73+	0.76+	0.76+	0.76+
	(-1.52)	(-1.58)	(-1.6)	(-1.41)	(-1.41)	(-1.41)
Father's employment (ever had paid employment)	1.2	1.21	1.21	1.23	1.23	1.23
	(0.95)	(1.01)	(1.03)	(1.1)	(1.1)	(1.11)
Mother's education (ever went to school)	1.1	1.1	1.11	1.17	1.16	1.17
	(0.3)	(0.3)	(0.34)	(0.49)	(0.47)	(0.49)
Mother's children ever born	0.95	0.95	0.95	0.95	0.95	0.95
	(-1.33)	(-1.41)	(-1.37)	(-1.38)	(-1.37)	(-1.37)
Parental contraceptive use (parents ever use)	0.68*	0.68*	0.68*	0.69*	0.69*	0.69*
	(-1.88)	(-1.9)	(-1.88)	(-1.83)	(-1.84)	(-1.83)
Ethnicity[b]						
Low caste Hindu	1.71+	1.61+	1.65+	1.71+	1.7+	1.7+
	(1.53)	(1.37)	(1.45)	(1.54)	(1.52)	(1.52)
Newar	0.92	0.9	0.9	1.05	1.01	1.03
	(-0.23)	(-0.31)	(-0.31)	(0.13)	(0.04)	(0.09)
Hill Tibeto-Burmese	0.94	0.87	0.86	0.85	0.86	0.85
	(-0.23)	(-0.51)	(-0.55)	(-0.6)	(-0.57)	(-0.58)
Terai Tibeto-Burmese	1.08	1.06	1.05	0.95	0.95	0.95
	(0.31)	(0.22)	(0.21)	(-0.22)	(-0.22)	(-0.21)
Birth cohort[c]						
Born 1976-1972 (age 20-24 in 1996)	0.84	0.84	0.83	0.88	0.88	0.88
	(-0.61)	(-0.61)	(-0.65)	(-0.46)	(-0.44)	(-0.44)
Born 1971-1967 (age 25-29 in 1996)	0.74	0.72	0.72	0.79	0.8	0.8
	(-0.89)	(-0.97)	(-0.95)	(-0.66)	(-0.65)	(-0.63)
Born 1966-1952 (age 30-44 in 1996)	0.77	0.76	0.77	0.9	0.9	0.9
	(-0.67)	(-0.7)	(-0.68)	(-0.28)	(-0.27)	(-0.25)

(cont.)

Table 6.4. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

Some people think a married son should live with his parents in their old age.						
	Closest provider			**All providers, geographically**		
	1	2	3	4	5	6
In 1994 lived in same neighborhood as in 1996	0.93	0.92	0.92	0.87	0.86	0.86
	(-0.28)	(-0.35)	(-0.33)	(-0.56)	(-0.6)	(-0.59)
Childbearing and contraceptive history						
Used contraception after 1996 interview, but before 1st regular month of registry	1.18	1.13	1.16	1.23	1.23	1.23
	(0.66)	(0.5)	(0.59)	(0.81)	(0.81)	(0.82)
Ever used contraception before 1996	1.31	1.3	1.29	1.34	1.34	1.34
	(0.76)	(0.74)	(0.73)	(0.82)	(0.82)	(0.82)
ICC	0.00	0.00	0.00	0.00	0.00	0.00
N	1252	1252	1252	1252	1252	1252

[a]Also includes dummies for calendar month and year.

[b]Reference group is Upper Caste Hindu.

[c]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 6.5. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

	To be an infertile woman is the same as not having a life.					
	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Health Services (difference between 1994 and 1970)						
Family planning methods	0.6 (-0.91)			0.22+ (-1.34)		
Oral rehydration therapy		1.02 (0.02)			0.22+ (-1.35)	
Prenatal care			0.61 (-0.68)			0.23+ (-1.31)
Controls[a]						
Community characteristics						
Number of non-family organizations in childhood community (before age 12)	1.07 (0.64)	1.06 (0.6)	1.06 (0.6)	1.06 (0.61)	1.06 (0.61)	1.06 (0.61)
School within 5 minute walk in 1996	0.66 (-0.85)	0.67 (-0.8)	0.64 (-0.88)	0.78 (-0.49)	0.77 (-0.51)	0.76 (-0.53)
Non-family experiences before 1996						
Visited a health service provider	1.02 (0.04)	1.02 (0.03)	1.02 (0.03)	1.03 (0.06)	1.04 (0.06)	1.04 (0.06)
Number of other non-family experiences	1.39 (2.6)	1.39 (2.6)	1.39 (2.6)	1.40 (2.68)	1.40 (2.68)	1.40 (2.67)
Marital and childbearing history						
Total number of children born before 1996	1 (-0.01)	1 (-0.04)	1 (-0.05)	0.99 (-0.14)	0.99 (-0.14)	0.99 (-0.14)
Total number of children died before 1996	0.72+ (-1.45)	0.73+ (-1.43)	0.73+ (-1.43)	0.73+ (-1.43)	0.73+ (-1.43)	0.73+ (-1.43)
Married in 1996	16.81*** (6.39)	16.87*** (6.38)	16.89*** (6.39)	17.34*** (6.42)	17.31*** (6.42)	17.27*** (6.42)

(cont.)

Table 6.5. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

	To be an infertile woman is the same as not having a life.					
	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Family Background						
Father's education (ever went to school)	1.04	1.03	1.03	1.04	1.04	1.04
	(0.14)	(0.13)	(0.13)	(0.16)	(0.16)	(0.16)
Father's employment (ever had paid employment)	1.61	1.61	1.61	1.61	1.61	1.61
	(2.08)	(2.06)	(2.07)	(2.07)	(2.06)	(2.07)
Mother's education (ever went to school)	0.39***	0.39***	0.39***	0.39**	0.39**	0.39**
	(-3.14)	(-3.14)	(-3.12)	(-3.07)	(-3.08)	(-3.07)
Mother's children ever born	1.1*	1.1*	1.1*	1.1*	1.1*	1.1*
	(1.97)	(1.96)	(1.97)	(1.94)	(1.94)	(1.94)
Parental contraceptive use (parents ever use)	0.74	0.74	0.74	0.74	0.74	0.74
	(-1.22)	(-1.22)	(-1.22)	(-1.21)	(-1.21)	(-1.21)
Ethnicity[b]						
Low caste Hindu	1.42	1.44	1.45	1.45	1.45	1.45
	(0.73)	(0.75)	(0.77)	(0.77)	(0.77)	(0.77)
Newar	0.71	0.71	0.71	0.75	0.75	0.75
	(-0.86)	(-0.84)	(-0.85)	(-0.72)	(-0.74)	(-0.73)
Hill Tibeto-Burmese	1.17	1.2	1.19	1.14	1.14	1.15
	(0.39)	(0.45)	(0.42)	(0.33)	(0.33)	(0.34)
Terai Tibeto-Burmese	3.63**	3.55**	3.5**	3.26*	3.26*	3.28*
	(2.49)	(2.44)	(2.42)	(2.28)	(2.28)	(2.29)
Birth cohort[c]						
Born 1976-1972 (age 20-24 in 1996)	0.29***	0.29***	0.29***	0.29***	0.29***	0.29***
	(-3.47)	(-3.47)	(-3.48)	(-3.48)	(-3.48)	(-3.48)
Born 1971-1967 (age 25-29 in 1996)	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***
	(-5.57)	(-5.55)	(-5.55)	(-5.51)	(-5.51)	(-5.5)
Born 1966-1952 (age 30-44 in 1996)	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***
	(-5.1)	(-5.08)	(-5.09)	(-5.02)	(-5.02)	(-5.01)

(cont.)

Table 6.5. Multilevel Logistic Regression Estimates: Relationship between Change in Health Services and Attitudes

	To be an infertile woman is the same as not having a life.					
	Closest provider			All providers, geographically		
	1	2	3	4	5	6
In 1994 lived in same neighborhood as in 1996	2.53***	2.55***	2.55***	2.54***	2.54***	2.54***
	(3.36)	(3.38)	(3.38)	(3.37)	(3.37)	(3.37)
Childbearing and contraceptive history						
Used contraception after 1996 interview, but before 1st regular month of registry	0.78	0.79	0.79	0.81	0.81	0.81
	(-0.72)	(-0.7)	(-0.68)	(-0.63)	(-0.63)	(-0.63)
Ever used contraception before 1996	0.86	0.86	0.85	0.85	0.85	0.84
	(-0.36)	(-0.38)	(-0.39)	(-0.41)	(-0.41)	(-0.41)
ICC	0.94	0.94	0.94	0.94	0.94	0.94
N	1252	1252	1252	1252	1252	1252

[a]Also includes dummies for calendar month and year.

[b]Reference group is Upper Caste Hindu.

[c]Reference group is born 1981-1977 (age 15-29 in 1996).

$+ p < .10$; $* p < .05$; $** p < .01$; $*** p < .001$; one-tailed tests

Table 6.6. Multilevel Hazard Model Estimates: Relationship between Attitudes and Any Contraceptive Use

	1	2	3	4
Attitudes				
Some people think having many children would help parents do their work.	0.86* (-1.73)			0.85* (-1.92)
Some people think a married son should live with his parents in their old age.		0.82* (-1.76)		0.82* (-1.73)
To be an infertile woman is the same as not having a life.			0.51** (-2.97)	0.5** (-3.06)
Controls[a]				
Community characteristics				
Number of non-family organizations in childhood community (before age 12)	1.05 (1.25)	1.05 (1.22)	1.05 (1.23)	1.05 (1.2)
School within 5 minute walk in 1996	1.02 (0.2)	1.01 (0.07)	1.00 (0.02)	1.01 (0.05)
Non-family experiences before 1996				
Visited a health service provider	2.1*** (3.26)	2.17*** (3.41)	2.15*** (3.38)	2.1*** (3.25)
Number of other non-family experiences	0.93 (-1.84)	0.94 (-1.64)	0.94 (-1.59)	0.94 (-1.67)
Childbearing history				
Total number of children born before 1996	1.1** (2.57)	1.1** (2.5)	1.1** (2.65)	1.1** (2.56)
Total number of children died before 1996	1.04 (0.39)	1.05 (0.5)	1.04 (0.36)	1.04 (0.36)
Family Background				
Father's education (ever went to school)	0.9 (-1.12)	0.9 (-1.22)	0.9 (-1.21)	0.89+ (-1.35)
Father's employment (ever had paid employment)	1.1 (1.17)	1.09 (1.06)	1.09 (1.1)	1.11+ (1.35)
Mother's education (ever went to school)	0.91 (-0.72)	0.9 (-0.77)	0.89 (-0.86)	0.9 (-0.8)
Mother's children ever born	0.95** (-2.77)	0.95** (-2.78)	0.96** (-2.62)	0.96** (-2.67)
Parental contraceptive use (parents ever use)	1.01 (0.09)	1.01 (0.08)	1.01 (0.07)	0.99 (-0.06)
Ethnicity[b]				
Low caste Hindu	1.22+ (1.4)	1.22+ (1.39)	1.21+ (1.35)	1.24+ (1.55)
Newar	1.3+ (1.56)	1.28+ (1.5)	1.28+ (1.5)	1.3+ (1.57)
Hill Tibeto-Burmese	1.28* (1.96)	1.29* (2.02)	1.27* (1.88)	1.29* (1.98)
Terai Tibeto-Burmese	0.93 (-0.53)	0.92 (-0.68)	0.91 (-0.72)	0.95 (-0.37)

(cont.)

Table 6.6. Multilevel Hazard Model Estimates: Relationship between Attitudes and Any Contraceptive Use

	1	2	3	4
Birth cohort[c]				
Born 1976-1972 (age 20-24 in 1996)	0.89	0.9	0.9	0.88
	(-1.14)	(-0.98)	(-0.99)	(-1.2)
Born 1971-1967 (age 25-29 in 1996)	0.67**	0.67**	0.67**	0.66**
	(-2.92)	(-2.92)	(-2.87)	(-3.03)
Born 1966-1952 (age 30-44 in 1996)	0.19***	0.19***	0.19***	0.18***
	(-8.84)	(-8.81)	(-8.91)	(-8.97)
In 1994 lived in same neighborhood as in 1996	0.84*	0.82*	0.83*	0.83*
	(-1.87)	(-2.03)	(-1.98)	(-1.97)
Contraceptive history				
Ever used contraception before 1996	1.4***	1.41***	1.43***	1.4**
	(3.09)	(3.16)	(3.28)	(3.05)
Used contraception after 1996 interview, but before 1st regular month of registry	36.23***	36.7***	36.44***	37.9***
	(21.36)	(21.37)	(21.39)	(21.43)
ICC	0.12	0.12	0.13	0.13
Person months	68661	68661	68661	68661

[a]Also includes dummies for calendar month and year.

[b]Reference group is Upper Caste Hindu.

[c]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 6.7. Multilevel Hazard Model Estimates: Relationship between Health Services and Any Contraceptive Use[a]

	Closest provider			All providers, geographically		
	1	2	3	4	5	6
Health Services (geoweighted log of difference between 1994 and 1970)						
Family planning methods	0.83			1.73**		
	(-1.81)			(2.41)		
Oral rehydration therapy		0.72			1.75**	
		(-1.75)			(2.51)	
Prenatal services			1.27+			1.81**
			(1.51)			(2.62)
ICC	0.12	0.12	0.12	0.12	0.11	0.11
Person months	68661	68661	68661	68661	68661	68661

[a]Includes all controls in Table 6.6.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 6.8. Multilevel Hazard Model Estimates: Relationship between Health Services, Attitudes, and Contraceptive Use[a]

	1	2	3
Health Services (geoweighted log of difference between 1994 and 1970)			
Family planning methods	1.64* (2.14)		
Oral rehydration therapy		1.66* (2.25)	
Prenatal services			1.71** (2.35)
Attitudes			
Some people think having many children would help parents do their work.	0.86* (-1.8)	0.86* (-1.8)	0.86* (-1.79)
Some people think a married son should live with his parents in their old age.	0.84+ (-1.54)	0.84+ (-1.53)	0.84+ (-1.52)
To be an infertile woman is the same as not having a life.	0.51** (-2.99)	0.51** (-2.98)	0.51** (-2.98)
ICC	0.12	0.12	0.12
Person months	68661	68661	68661

[a]Includes all controls in Table 6.6 and described above.

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

CHAPTER 7

SCHOOLS, ATTITUDES ABOUT FAMILIAL ROLES, AND CONTRACEPTIVE USE

Introduction

This chapter investigates the relationship between school quality, attitudes about individuals' roles and responsibilities, and contraceptive use behavior. Substantial bodies of literature cover how aspects of school quality—including material inputs, teacher education, curriculum, and peer characteristics—influence students' academic outcomes (Card and Krueger 1992, 1996; Fuller 1987; Heyneman and Loxley 1983; Lloyd et al. 2003; Lloyd, Mensch, and Clark 2000). Other empirical and theoretical research documents the effect of education and exposure to schools on fertility related behaviors (Axinn 1993; Blossfeld and Huinink 1991; Caldwell 1982; Lloyd, Kaufman and Hewett 2000; Martin 1995; Thornton, Axinn, and Teachman 1995). However, little research has looked at the direct relationship between these dimensions of school quality and fertility behaviors.

When examining school effects it is important to consider the specific broader social and cultural contexts in question (Fuller and Clarke 1994). The specific characteristics of a school that are influential in one setting may not be in another. Empirical work comparing the effects of school quality in wealthy and poor countries has found considerable differences in the effects of various school qualities on outcomes

(Fuller 1987; Heyneman and Loxley 1983; Lee and Barro 2001; Lockheed, Vail, and Fuller 1986; Wayne and Youngs 2003). I consider four aspects of school quality that may be particular important in this setting: curriculum characteristics, teacher characteristics, student body characteristics, and financial costs.

A large body of literature in the field of education investigates the effects of school quality on academic outcomes (for good reviews of the literature regarding what dimensions of schools influence academic achievement see Card and Krueger 1996, Fuller 1987, and Wayne and Youngs 2003). Empirical evidence supports the claim that curriculum, teacher quality, and student characteristics do influence students' academic outcomes and are important to examine when considering the effects of schooling and schools (Behrman and Birdsall 1983; Card and Krueger 1996; Fuller 1987; Heyneman and Loxley 1983). However, little empirical work has investigated the effects of school quality on non-academic outcomes such as contraceptive use later in life. Since we have considerable cross-cultural evidence that an individual's education and access to schools affect their fertility it is likely that specific aspects of school quality are also related to fertility behaviors such as contraceptive use.

Additionally, little empirical research has considered the effects of school quality on those living nearby schools who are not students (for two noteworthy exceptions see Glewwe and Jacoby 1994 and Lloyd, Mensch, and Clark 2000). Previous research has shown both children's and neighbors schooling is associated with increased contraceptive use (Axinn and Barber 2001; Kravdal 2002; McNay et al. 2003). I expect that exposure to certain school qualities will be related to the attitudes and behaviors of both individuals who attend school and those who do not.

Much of the literature about the relationship between schools and contraceptive use focuses on three potential explanations. First, role incompatibility. When women are enrolled in school they are more likely to use contraception because having a child would be incompatible with their role as a student; it is difficult to tend to children while also attending classes. This incompatibility essentially raises the costs of childbearing resulting in increased contraceptive use. Second, future opportunity costs. Being better educated means that a woman will have better job opportunities. This places a much higher cost on childbearing thereby increasing subsequent use of contraceptives. Third, attitudes. Schools and education may change women's attitudes and preferences such that they assess the costs and benefits of childbearing and contraceptive use to be more in favor of contraception.

This chapter gives special attention to this third mechanism. Virtually no empirical research has explicitly investigated the degree to which attitudes are a mechanism through which schools or specific characteristics of schools are related to contraceptive use. By explicitly examining whether exposure to family planning curricula, better educated and female teachers, students teachers, and financial costs are related to attitudes about familial roles and responsibilities I provide evidence regarding whether women who had more exposure to these measures of school quality actually have attitudes associated with higher costs of childbearing and with more contraceptive use. As a result, these analyses provide important new information on the broader issue of how social context influences individual behavior and the relative roles of structural and ideational causes of change.

This chapter provides a significant addition to the existing literature in four ways. First, I investigate various dimensions of school quality to understand more fully the process through which the presence of a school in a community influences individuals. Second, by considering contraceptive use as the outcome this research provides new information on the range of effects of school quality. Third, this chapter considers the effects of school quality on a broad population rather than only on students, providing new information on the full range of these effects. Fourth, I provide new information on attitudes as a mechanism through which school quality influences contraceptive use.

Linking attitudes and contraceptive use

Following from the framework in Chapter 2 and the empirical results in Chapter 5, we see that attitudes from multiple domains may be related to contraceptive use. The specific domain I investigate in this chapter is women's attitudes about individuals' roles within the family. First, consider the role of women in the family. Although empirical findings are somewhat mixed, considerable evidence supports the idea that women who are more involved in household decision-making have higher rates of contraceptive use and lower fertility (Basu 1996; Dyson and Moore 1983; Dharmalingan and Morgan 1996; Hindin 2000; Jain 1981; Jejeebhoy 1995; Mason 1987; Morgan and Niraula 1995; Morgan et al. 2002; Moursund and Kravdal 2003). This existing literature focuses on measures of women's actual participation in decision-making. However, women's attitudes about decision-making are also likely to influence their contraceptive behavior. Women who believe that husbands should make all the household decisions will have higher costs of using contraception than women who believe otherwise (Bennet 1983). For the former, the costs of contraceptive use must also include any emotional costs of

raising the topic of contraceptive use with their husbands and expressing their desire to use. Similarly, for these women it is likely that any costs associated with traveling to obtain a method will be higher because they also include input or cooperation from the husband. These higher costs of contraceptive use will then result in lowered actual use.

Second, consider the roles of children within the family. Individuals' attitudes about these roles may influence their contraceptive behavior by changing an individual's assessment of the benefits of childbearing. One long-standing theoretical line in demography and economics holds that much of this benefit comes from children's contribution to household production (Becker 1991; Becker and Lewis 1973; Cain 1983; Easterlin and Crimmins 1985; Willis 1973). Couples have many children because children decrease the workload for other family members or increase the overall production of the household (Cain 1977). When women believe that children help their parents with their work they see greater benefits to having children and are therefore less likely to use contraception.

Theoretical and empirical research illustrate that the benefits of childbearing may also come from non-economic considerations (Bulatao and Lee 1983; Edin and Kefalas 2005; Hoffman and Hoffman 1973; Hoffman, Thornton, and Manis 1978). For instance, children may help maintain or increase family honor or standing within society. One way this happens in Nepal is through marriage. Nepal is a Hindu country with a history of little inter-caste marriage. When inter-caste marriages do occur the couple is almost always punished—they may be ostracized from their families and communities or they may be forced to move (Bista 1972, 1991). It is true that inter-caste marriages are becoming more common but they are still rare and newspaper articles still report their

occurrence and the subsequent punishment.[31] Because of the high importance of same caste marriage, one benefit to having children comes from their willingness to follow this pattern. Should a child marry someone of a different caste, the costs of having had this child—the social and emotional consequences all family members endure—are raised. For some these costs may be so great the parents may wish they had never had the child.

The importance women place on caste is also important because it may reflect their attitude towards the larger issue of self-determination. In general, Nepalese life has historically been governed more by fatalism and less by self-determination (Bista 1991). Nepal is officially a Hindu kingdom and a key component of Nepalese Hinduism is belief in fatalism—individuals often believe they have little, if any, control over their futures (Bista 1991).[32] For example, one common saying in Nepal loosely translates as "one can have only what is written on the forehead" and is in reference to one's fate being ascribed to him at birth (Bista 1991). Under fatalism there is very little benefit from using contraception—childbearing is a piece of life that is predetermined and therefore there is no desire to limit or control it through contraceptive use. As this reliance on fatalism decreases and stronger beliefs in self-determination increase, individuals' may have more desire to control fertility and therefore assess greater benefits to using contraception. To the extent that a high value of inter-caste marriage reflects a stronger connection to

[31] One obvious exception to this is marriages between the two highest castes—Brahmins and Chetris—which occur with some frequency. However, even these marriages are considered to be less optimal for Brahmins than Brahmin-Brahmin marriages. Any children from these unions are Chetris, the lower of the two castes, and as a result must follow certain practices such as remaining in certain areas of the kitchen.
[32] Nepalese Hinduism is different from orthodox Hinduism, especially as it relates to caste. Because there are many different ethnic groups in Nepal the caste hierarchy has been altered to suit the particulars of Nepal (Bista 1991). As a result, the caste system in Nepal does exist, but influences life to a lesser degree than in other settings. However, partly because it is so intricately tied to ethnicity, it is still a reality for virtually all Nepalese, especially with regards to marriage (Bista 1972, 1991).

fatalism, then disapproval of inter-caste marriage will be related to less use of contraception.

Linking schools, attitudes, and contraceptive use

I now turn to a discussion of how exposure to various aspects of school quality may influence these attitudes and contraceptive use. However, before describing the specifics as they relate to school quality, there is one theoretical implication from the framework described in Chapter 2 that is important to articulate here: both individual's experiences with and exposure to schools may influence their behavior. A substantial amount of research links both school enrollment and educational attainment to fertility related behaviors such as contraceptive use and childbearing (Axinn and Barber 2001; Blossfeld and Huinink 1991; Jain 1981; Thornton, Axinn, and Teachman 1995). Country level comparisons reveal that countries with higher average levels of education have lower fertility (Jain 1981; Lloyd, Kaufman, and Hewett 2000; Martin 1995; Singh and Casterline 1985). Individual level analyses have found similar connections between schools or education and childbearing. These analyses have investigated both the effect of an individual's own schooling and the effect of her children's schooling on her fertility. The first branch, that concerning women's own education, is dominated by two ideas: 1) that women learn about contraception when they attend school and consequently postpone or limit their childbearing (Cochrane, Khan, and Osheba 1990); and 2) that more educated women have more income generating opportunities outside the household which increases the opportunity costs of having children (Birdsall 1988; Schultz 1993). Other theories concerning the mechanism through which women's own schooling influences their own childbearing behavior are that more educated women have higher

status within their families and are therefore more capable of limiting their own fertility (Jain 1981; Mason 1987, 2001), or that more educated women choose to educate their children which then causes them to lower their fertility (Lam and Duryea 1999).

This leads to the second branch of literature, that concerning the role of children's education on their mother's fertility (Axinn 1993; Axinn and Barber 2001). In some economic theories of fertility this effect has been referred to as the quality-quantity tradeoff—parents choose to have fewer children (quantity) in order to invest more in their existing children (quality) (Becker 1991; Becker and Lewis 1973; Willis 1973). Children's schooling influences parental fertility by increasing the costs of having children (Becker 1991; Becker and Lewis 1973; Caldwell 1982; Willis 1973). Children's schooling may also be important because it increases their independence from their parents (Thornton and Lin 1994). By going to school and engaging in activities outside of the household children gain more independence from their families. Consequently, their beliefs may change to become more in favor of education, of paid employment outside the home, later age at marriage, later childbearing, contraceptive use, and smaller families (Caldwell 1982; Thornton and Lin 1994). With these new ideas, children may act in ways that lower the benefits of childbearing for their parents. For instance, children may become less likely to help with household chores. We might also see an effect of children's education, and their subsequent new ideas, on their parents' childbearing behavior if those children cause their parents' attitudes to also become more in favor of non-family activities—with these new attitudes having additional children may require the parents to make sacrifices that they are no longer will to make.

The effect of children's schooling on parents' attitudes and behavior is one example of how exposure to schools outside of one's own education may influence the individual. Exposure refers to what individuals see and hear about the school from the outside—that is what they know of the school apart from their own experiences with it. This includes the formal and informal interactions with children and neighbors who may have attended school, interactions with those who work at the schools, and through increased familiarity with the schools and the material presented in them (Caldwell 1982; Mead [1934] 1967; Zajonc 1968). For instance, schools with family planning curricula may influence non-students' contraceptive use because women in the community learn what materials are presented in class through informal communication with neighbors who may have gone to school in their youth or have sent their children to school (Caldwell 1982). Couples may also learn these new ideas through casual interactions with school employees as they are going to and from work. Recent research has found evidence that the education experiences of others in the community, especially neighbors and children, have strong influences on women's contraceptive use (Axinn and Barber 2001; Kravdal 2002; McNay et al. 2001). This chapter builds on this research by focusing on exposure effects.

The presence of a school and the expectation of children's education may increase contraceptive use by changing the meaning of childhood in that community (Caldwell 1982; Caldwell, Reddy, and Caldwell 1985). Childhood may change from being a time where children contribute labor to the household to a time where parents invest in their children in order to gain some benefits later in life. Consequently, women, even those who do not send their own children to school, may demand fewer household productive

activities, such as working in the fields or preparing meals, from their children (Caldwell, Reddy, and Caldwell 1985). The social demands or norms in a community with a school versus a community without one may be different such that in the community with a school children may not be required to participate in as much household productive labor. As I mentioned above, when children cease to be a net benefit for parents and become a net cost parents are more likely to use contraception.

Furthermore, increased exposure to schools may foster attitudes that make individuals believe that their place in society and within the family is defined more by their actions and less by their birth. As I mentioned above, many Nepalese believe that one's fate is predetermined (Bista 1991). Individuals see fewer benefits to contraceptive use if their role as childbearer or childrearer, the number of children they have, and their potential job options are all determined for them, either by fate, the gods, or their families. In Chapter 2 I argued that the individual's assessment of the costs of childbearing and benefits of education and work are important components of the benefits of contraceptive use and actual contraceptive use behavior.

Because schools provide examples of how effort and work may change one's life course they may influence contraceptive use by changing this view of predetermination (Bista 1991; Weber 1930 [2002]). For example, in schools pupils are rewarded for their efforts by receiving high marks or being promoted to the next grade. Also, teachers themselves may be seen as examples of how industriousness can yield different life options. In this rural, agricultural setting teaching represents a new type of employment. In many cases the teachers themselves come from small, subsistence farming families and have worked hard to find this new path.

To increase our understanding of this broad relationship between schools and fertility I consider specific programmatic mechanisms through which this effect occurs. The curriculum taught at schools may influence individuals' attitudes and behavior (Lloyd, Mensch, and Clark 2000; Lloyd et al. 2003). Family planning curricula may have a particularly strong effect on contraceptive use and effect attitudes because of the multiple messages regarding Western families and the relationship between family size and wealth often included in the curriculum. As early as the 1960s extensive evidence demonstrated that organized family planning programs had substantial influence on couples' childbearing behavior, particularly in terms of contraceptive use and choice of effective methods (Angeles, Guilkey, and Mroz 1998; Entwisle et al. 1996; Freedman and Takeshita 1969; Koenig et al. 1987; Phillips et al. 1982). The provision of contraceptive methods may influence barriers such as lack of information and social pressures to avoid using modern methods.

In addition to providing information on effective contraceptive methods, the provision of family planning services often includes information that may change individual's attitudes as well. For instance, family planning motivation programs often include information on the "benefit of small families" and delayed or limited childbearing. This information may contribute to women re-evaluating their roles within the household. Additionally, a key component of many family planning curricula is empowering women to act on their own childbearing desires and preferences. Often these programs try to help women become more comfortable expressing their views and opinions to their husbands and other family members. Although the focus of these

programs is on increasing dialogue around contraceptive use and childbearing it is likely that these programs also influence women's contributions to other household decisions.

Length of enrollment, or educational attainment, is one way exposure to certain school qualities may influence individual's attitudes about children and family and actual contraceptive use behavior (Axinn and Barber 2001; Fuller, Hua, and Snyder 1994; Lloyd, Mensch, and Clark 2000; Thornton, Axinn, and Teachman 1995). When children attend school for longer periods of time they, their families, and their neighbors are likely to be more influenced by the children's education experiences than when children attend for only short periods. For instance, we may expect to see a larger effect on parental behavior because of the long-term financial burden of longer enrollment. Additionally, exposure over a longer time period may result in a stronger effect on attitudes and behaviors (Zajonc 1968). Length of enrollment may also be important because some types of curricula, such as family planning, may only be offered in more advanced grades. Also, the concept of childhood is likely to be different in communities where children only attend school through second grade and then return to working in the household as opposed to communities where they remain in school through 10^{th} grade (the official last year of high school in Nepal). Finally, longer enrollment, or higher attainment, may result in the student, or child, having more non-family work opportunities after completion of schooling. These opportunities themselves may further change the individual's attitudes and therefore the parents' attitudes and behavior.

Better-educated teachers may lengthen enrollment because they may be better able to manage and engage a classroom (Card and Krueger 1992; Bedi and Edwards 2002; Lee and Barro 2001; Lloyd, Mensch, and Clark 2000; Lloyd et al. 2003).

Additionally, better-educated teachers may be more able to convey the material to their students thereby increasing the effect of whatever time the student does attend school (Heyneman and Loxley 1983). Previous research has found that teacher's education is one aspect of teacher quality that is associated with higher student achievement (Heyneman and Loxely 1983). I predict that better-educated teachers will increase individual's autonomy from their families, increase their attachment to non-family organizations, and weaken family oriented beliefs about family roles. In turn, this will influence the beliefs and behaviors of their parents, and the parents of their neighbors, decreasing childbearing and increasing contraceptive use.

Female teachers may be especially important in increasing the length of enrollment for female students in Nepal (Lloyd, Mensch, and Clark 2000). Previous research has shown that girls educational outcomes are higher when they have female teachers (Dee 2007; Mensch and Lloyd 1998; Nixon and Robinson 1999). Research has also demonstrated that women's education is linked to women's autonomy and power in the labor market (Mason 1987, 1997). Based on both of these findings I expect that women exposed to female teachers will have higher costs of childbearing and are therefore more likely to use contraception.

Female teachers may also be important to the extent that they serve as role models for female students and other women in the community (Dee 2007; Haveman and Wolfe 1995; Nixon and Robinson 1999). By showing them first hand that there are alternatives to working in the home, the presence of female teachers in a school may increase women's interests in work and activities outside the home and weaken their connection to their homes and families. Women in the community may respond to seeing and

interacting with female teachers by desiring more autonomy and non-family opportunities such as education and wage labor for themselves or their children. This, in turn, may cause them to delay or limit their childbearing by using contraception.

For women, the proportion of students who are girls or teachers who are women are aspects of school quality that may be related to their attitudes about roles in the family and society and their contraceptive use behavior. Single-sex schooling has been linked to higher educational outcomes for girls (Jimenez and Lockheed 1989). Importantly, previous research has also found that girls who attend single-sex schools also held more equitable attitudes about gender roles and more liberal, or Western, attitudes about women's roles in society (Lee and Lockheed 1990; Mael 1998). I predict that women exposed to larger proportions of female student bodies will have less family oriented attitudes about family members' roles. Also, larger proportions of girl students may increase the costs of childbearing more resulting in increased contraceptive use.

Also, characteristics of schools that convey high quality in general to community members may be important. In this setting, individuals see fees as a signal of school quality. A common sentiment is that if the school is demanding extra payment you must be getting something for it. Women were also often distrustful of free services—doubting their value or their quality since the government, or whomever was running the school, was just "giving it away." So, schools that require fee payments are likely seen as "better" than free schools. Also, these fees are often associated with extra services provided by the school such as lab or library fees. This effect is opposite from how financial costs may or may not be related to *access* to schools. Schools that require extra fees are, by definition, not as accessible to everyone as schools without fees. However,

whether an individual actually can or does attend school is not the focus of the hypotheses tested here. The more relevant component is how community members perceive schools and how they respond to the messages being put out by schools. Fee requirements are a tool schools can use to show community members the value of education in general, in addition to the education to be obtained at that school. Education is not a free service that can be taken or left at will. It is an important activity in society and as such demands payment for it. Consequently, I predict that women with more exposure to schools that require fees for first grade will use contraception before women with less exposure to these "better" schools.

Data and Measures

Data

The data used here are described in detail in Chapter 4.

Analysis sample. The analysis sample for this chapter is the 1,226 women aged 15-44 in 1996, married by 2006, not sterilized before 1997, and not missing data for any of the variables included in these analyses.

Measures

Contraceptive use.

This chapter considers the same dependent variable used in Chapter 6, the use of any contraceptive method. The measure is described in detail in Chapter 4 and descriptive statistics for it are in Table 4.4. Fifty-nine percent of women in this sample used contraceptives between 1997 and 2006.

Attitudes.

I investigate three measures that capture different aspects of attitudes about familial roles that may be relevant for an individual's contraceptive use decision making. All attitude measures come from the individual survey conducted in 1996. The first measure attempts to capture the relative roles of household members. Respondents were asked: "A man should make most of the decisions in the household. Would you say you strongly agree, agree, disagree, or strongly disagree?" I recoded this measure into a dichotomous variable equal to one if the respondent agreed or strongly agreed with the statement and zero otherwise.[33] Table 7.1 presents descriptive statistics for this and all the other individual level measures in these analyses. Sixty-four percent of women agreed that a man should make most of the decisions. I predict that women who are exposed to certain aspects of school quality will have a more egalitarian response to this measure and be more likely to use contraception.

(Table 7.1, about here)

The second attitude measure I investigate is the respondent's assessment of the immediate benefits of children. Respondents were asked: "Some people think that having many children would help parents do their work. Do you strongly agree, somewhat agree, or don't agree at all?" I recode this into a dichotomous variable equal to one if the respondent strongly agreed and zero otherwise. Thirty-three percent of women in this sample strongly agreed that children help parents with their work. I expect that women

[33] I recode all the attitude measures in this chapter into dichotomous variables. The original measures varied in the number of response categories allowed so recoding them creates more consistency across analyses. Models with the first attitude are essentially identical for both dichotomous and ordinal measures. I discuss the different effects for models with the second attitude as a dichotomous versus ordinal measure. The measures of school quality do not have significant effects when predicting the third attitude as an ordinal measure, but the ordinal measure is significantly related to the hazard of contraceptive use.

who have more exposure to schools and to better quality schools will be less likely to report that children help parents with their work and that women who report that children help parents with their work will use contraception after women who do not believe children help parents.

The final attitude measure is the relative importance of caste. Respondents were asked: "It is better to have no children than to have a child who marries a spouse of a different caste. Do you strongly agree, agree, disagree, or strongly disagree?" I recoded this measure into a dichotomous variable equal to 1 if the respondent agreed or strongly agreed (inter-caste marriage is unacceptable) and 0 if the respondent disagreed or strongly disagreed (it is acceptable for a child to marry a spouse of a different caste). Just over half of respondents felt that it was unacceptable for a child to marry a spouse of a different caste.

Schools.

The information used to create the measures of school quality described below come from the School History Calendars that were collected for all 145 schools that ever existed in this study area. These data are described in detail in Chapter 4.

When investigating the relationship between exposure to schools and individual attitudes and behavior it is important to consider when this exposure occurs. Recent theoretical and empirical research demonstrates that early family organization and experiences influence later life behaviors (Axinn and Yabiku 2001; Cherlin, Kiernan, and Chase-Lansdale 1995; Garces, Duncan, and Currie 2002; McLanahan and Sandefur 1994; Wu 1996; Wu and Martinson 1993; Wu and Thomson 2001; Yabiku, Axinn, and Thornton 1999). Following from this, early life experiences outside the family should

also be influential. Individuals growing up in situations where daily activities are organized within and around the family are more likely to have more family-oriented attitudes and beliefs. As more activities become organized outside the family, family integration decreases, and attitudes change to be less family oriented. Because schools are one aspect of social context that stimulates this change in family integration, exposure to schools during childhood should have long-term impacts on attitudes about the family and on family behaviors (Yabiku, Axinn, and Thornton 1999).

Because of the potential importance of early life exposure to schools, the measures of school quality I investigate in this paper capture an individuals' exposure to schools during childhood. Specifically, all five measures of exposure to school quality describe the individual's exposure at the time the respondent was 13 years old. I chose to use age 13 as the reference year for both theoretical and methodological reasons. It was important to measure school characteristics at a point early on in the respondents' life because attitudes form early on. Age thirteen is also important because individuals would have lived several years prior to this measure with the opportunity to become aware of what schooling options were available to them and to attend school and have exposure to these aspects of school quality.

Methodologically, age 13 was a crucial point because it allows me to include measures of the respondent's community during childhood (age 12 and earlier) as controls. In addition to neighborhood and school history calendars which are used to create the measures of schools described below, the CVFS asked a series of questions regarding the respondent's neighborhood during childhood directing the respondent to think of the neighborhood she lived in before age 12 when answering these questions. In

order to incorporate these additional controls, and maintain proper temporal ordering, the key independent variables refer to the schools following this early childhood period the year the respondent turned 13.

To measure an aspect of curriculum for each school I create a measure equal to one if that school taught a family planning curriculum in that year and zero otherwise. In Table 7.2 I show the distributions at the school level for both the first year that a school was open in Chitwan, 1954, and the year before the individual interviews were taken, 1995. Of the two schools open in 1954 in Chitwan, none of them provided family planning curricula (Table 7.2). However, by 1995 fifteen percent of the 123 open schools had such a curriculum.

(Table 7.2, about here)

I also created two measures of teacher characteristics. The first measure is the proportion of teachers in each school who were female in that year and the second measure is the proportion of teachers in a school that had at least a college education that year. Neither of the two schools open in 1954 had female or college educated teachers. By 1995 the mean proportion for both measures was around .20—or about 20 percent of the faculty.

The fourth measure of school quality I created captures the relative size of the female student body. This measure is the proportion of students enrolled in the school who are female. The mean proportion of students at each school that were female was only seven percent in 1954 with a maximum of only ten percent, but that has risen steadily over the years (as shown in Chapter 3) so that the mean is now just under half (Table 7.2).

The last measure I create is a dichotomous variable equal to one if the school required students to pay fees in order to attend first grade and zero otherwise in that year. None of the schools open in 1954 required fees for first grade whereas virtually all, 94 percent, of them did so by 1995.

Closest. The first set of measures I create refer to the school closest to the respondent's current neighborhood when she was 13 years old. For 63 percent of the women in this sample this neighborhood was not the actual neighborhood she was living in when she was 13. Rather, it is the neighborhood she moved into at some point after she was 13, but still refers to the year she was 13. I have no way of determining which neighborhood the respondent was living in at this point in her life if she was not living in the same neighborhood in which she was interviewed in 1996.

To create these measures I link each neighborhood to the school it was closest to in a specific year. These measures are as described above, except that they vary at the neighborhood level not at the school level. I present these neighborhood level descriptive statistics in Table 7.3. As you can see, the distribution of these characteristics changes when we examine them from this perspective. Whereas fewer than one fifth of schools provided a family planning curricula in 1995 one quarter of neighborhoods had one offered at the closest school.

(Table 7.3, about here)

After linking each neighborhood to its respective closest school for each year, I then link these neighborhood level measures to each individual selecting the characteristics of the closest school for the year the respondent was 13. I display the distributions of variables at the individual level in Table 7.4, Panel A.

(Table 7.4, about here)

Again, we see differences in exposure to school quality when we look at the distributions from this level. Looking at Table 7.4 we see that only 19 percent of women in the sample had a family planning curriculum at the school closest to their current neighborhood when they were 13 years old, whereas 27 percent of neighborhoods had a family planning curriculum offered at their closest school in 1995. Similarly, the mean proportion of students who are female across neighborhoods was .47. However, at the individual level, the mean proportion of students who are female at the closest school to their current neighborhood when they were 13 was .39.

Geographically weighted. When considering the effects of schools on individual behavior it is important to consider all the schools that may influence the individual, not just the closest (see Chapter 4 in this dissertation and Brauner-Otto et al. Forthcoming for more complete discussions of the need to reconceptualize measures of social context). I create measures of schools that incorporate information on all the schools that ever existed in the study area capturing the wide spatial distribution of schools and school quality.

For all five measures of school quality I create geographically weighted measures of the specific school characteristic which can be represented as:

$$S^{**}_{cnt} = \left(\sum_{l=1}^{145} \frac{S_{clt}}{W_{ln}} \right) \Big/ \sum_{l=1}^{145} W_{ln} \qquad \text{(equation 7.1)}$$

where S^{**}_{cnt} is the geographically-weighted average of school quality for characteristic *c* (e.g. family planning curriculum) and neighborhood *n* in the year *t* (the year the

respondent turned 13). S_{clt} is the characteristic *c* offered by school *l* in the year *t*, and W_{ln} is the weight for school *l* and neighborhood *n*. Because previous research and the theoretical framework described earlier predict that schools farther away will have less of an influence than those closer to the individual, I define W_{ln} as the distance between school *l* and neighborhood *n* (Buor 2002, 2003; Downey 2006). The summation over 145 schools is because that is the total number of schools that ever existed in Chitwan.[34]

To clarify, consider the measure of female teachers as an example. In the first step, for each school-neighborhood pair in a year (specifically the year the respondent turned 13) I divide the proportion of teachers who were female (S_{clt}) by the distance between that school and that neighborhood (W_{ln}) to create a weighted measure of female teachers. Next, I sum all of these weighted measures for one entire neighborhood—that is, I add up the weighted measure of female teachers for each of the 145 schools that were open that year. Finally, I divide this by the sum of the distances between that specific neighborhood and all of the open schools. In the end, I have a neighborhood level variable that refers to the individual's current neighborhood when she was 13 years old. Note, not all 145 schools were open in every year. Only schools that were open in that specific year were included in the calculations I just described.

Importantly, the metric for these measures changes when I take the variables for each school and combine them to create a geographically weighted measure for each neighborhood. Table 7.4, Panel B presents descriptive statistics for these geographically weighted measures at the individual level for the year the respondent turned 13. These measures are not dichotomous. They are continuous measures that have a large range and

[34] I then multiply this final result by 10 to scale the effect estimates.

variability. When we turn to the results it will be important to remember that these variables have a different metric than what we are used to thinking about. Looking at Panel B, row 1, we can not say that three percent of the individuals had access to a family planning curriculum. Rather, the mean geographically weighted average of the distribution of schools with family planning curriculums was .03 when respondents were aged 13. For some respondents, this average was much larger, such as those with the maximum of 1.50.

Controls.

In the models presented below I also include measures of characteristics that may influence the likelihood of living near certain schools, attitudes, and contraceptive use. Several of these controls (family background, ethnicity, and birth cohort) are described in Chapter 4 and descriptive statistics are presented in Table 4.1. Below I describe additional controls.[35] Their descriptive statistics are all presented in Table 7.1.

The theoretical framework described in Chapter 2 illustrates that organizations in ones community are an important influence on individual's attitudes and behaviors both through experiences with those organizations and through simple exposure to them. Substantial bodies of literature provide evidence that education, work, and living experiences, media exposure, participation in groups, and receipt of health services are all related to family related behaviors and attitudes (Axinn and Barber 2001; Axinn and Yabiku 2001; Barber 2004; Barber and Axinn 2004; Barber et al. 2002; Caldwell 1982; Lloyd, Kaufman, and Hewett 2000; Thornton, Alwin, and Camburn 1983; Zajonc 1968).

[35] I also estimated models that included a measure of the distance to the school closest to the respondent at age 13. The measure was not statistically significantly related to any of the attitude measures or the hazard of contraceptive use and the estimates for the other measures were not substantively different from those presented below. Because the geo-weighted measures incorporate this distance into their calculation I present the models without that added control.

As a result, I control for the both an individual's experiences and exposure to various aspects of community context. Because the measures of schools refer to year when the respondent was 13 these control measures describe the period prior to that.

I created two measures of experiences. One's own education and experiences with schools is certainly important—women who went to school early in life are more likely to live near a better quality school later on and to use contraception. As a result I include a dummy variable equal to one if the respondent attended school before age 13 and zero if she did not. Sixty-seven percent of respondent's had attended school.

Other non-family experiences are also important so I created an index of the number of other non-family experiences the respondent had. For this measure I created a series of six dichotomous variables equal to one if the respondent had worked for pay outside the home, lived away from her family, visited a health post, seen a movie, or participated in a club or group[36] before the age of 13 and zero otherwise, respectively. I then sum these dichotomous measures to create a single index.[37] The mean number of non-family experiences women in this sample had by age 12 was less than 1. Most of these experiences were quite rare, and in fact, no one had experienced all six. Creating an index allows me to include these experiences in the model without creating estimation problems due to small sample sizes.

[36] Groups refers to community based groups focusing on issues including women's issues, seed dispersion, micro-loans, and social groups.

[37] I also estimated models with these measures entered as separate dichotomous variables and models with an index of only the most common experiences. Only visiting a health service was positively and significantly related to the hazard of contraceptive use. Importantly, since these are only included as control measures, the different model specifications did not change the substantive results regarding the relationship between attitudes and the hazard of contraceptive use. Also, because of colinearity among these measures and with the measures of individual experiences later in life (discussed below) I elected to include these measures as an index and not as separate measures.

I also created a measure of the community the respondent lived in before age 12. This index is measured at the individual level, not at the community level. During the individual interviews respondents were asked numerous questions about the community they lived in before age 12. I use information from these questions to create the measures of childhood community characteristics. Following previous research, I created four dichotomous variables equal to one if the respondent had an employer, market, bus stop, or health service within an hours walk of her neighborhood before she was 12 years old and zero otherwise. I then sum these dichotomous measures to create an index of community characteristics during childhood (Axinn and Yabiku 2001; Brauner-Otto et al. Forthcoming). Like the measures of individual experiences before age 13, some of these community characteristics have little variation and combining them into an index measure allows for a simpler more easily estimated model. The mean number of organizations within an hours walk of their community before age 12 for the women in this sample was 2.93.

Finally, I control for migration. Because the measures of school characteristics refer to the respondent's current neighborhood when she was 13 years old, it is imperative to control for whether the respondent was living in the same neighborhood during her childhood as she was at the time of the interview. I create a dichotomous measure equal to one if the respondent had ever lived in the neighborhood before she was 13. Almost 40 percent of women had lived in their 1996 neighborhood at some point before the age of 13.

Analytic Strategy

This chapter has four analytic goals: 1) to investigate the relationship between attitudes and contraceptive use behavior; 2) to investigate the relationship between schools and attitudes about familial roles; 3) to investigate the relationship between schools and contraceptive use behavior; and 4) to examine the degree to which attitudes about familial roles may be a mechanism through which schools effect contraceptive behavior. The specific estimation strategy is presented in detail in Chapter 4. Here I provide only a brief summary.

These four separate goals require two different analytic approaches based on whether the dependent variable is attitudes or contraceptive use. I describe both methods separately below, detailing first the strategy for analyzing models of the effects of schools on attitudes and then the strategy for models with contraceptive use behavior as the outcome. For consistency, I also present my results in the same order.

Models with attitudes as the dependent variable. The analyses of the effect of schools on attitudes focus on one attitude measure at a time. Because all three attitude measures are dichotomous I estimate multilevel logistic models. The specific model is identical to that presented in equations 6.2 and 6.3. For these analyses $\mathbf{S_{nt}}$, where *t* is the year the respondent turned 13, includes the measures of school quality (S^{**}_{cnt}) defined above in equation 7.1 in the relevant models.

Models with contraceptive use as the dependent variable. As described in Chapter 4, I use discrete time methods to estimate multilevel event history models the risk of using contraception. Person-months of exposure are the unit of analysis and I consider women to be at risk after they marry for the first time. For women who marry

before February 1997 I start the hazard in the first month of the prospective data collection. Otherwise, I start the hazard the month after the respondent marries.[38]

The first set of models I analyze with this technique estimate the effect of attitudes about familial roles on the hazard of contraceptive use. The specific form of the logistic regression is identical to that presented in Chapter 4, equations 4.3 and 4.4. The second set of models using event history methods estimate the effect of school quality on the hazard of contraceptive use. The specific form of these logistic regressions is identical to that presented in equation 4.5 and 4.6 (again, S^{**}_{cnt} is included in the $\mathbf{S_{nt}}$ term when applicable). The final set of models I present are the full models that allow me to estimate the degree to which attitudes may be a mechanism through which schools influence the hazard of contraceptive use. The difference between $\boldsymbol{\beta}_{2n}$ in equation 4.5 and $\boldsymbol{\beta}_{2n}$ in equations 4.7 is equal to the indirect effects of $\mathbf{S_{nt}}$, schools, that influence contraceptive use $\mathbf{A}_{in}$, attitudes. The remaining effects of $\mathbf{S_{nt}}$ in equation 4.7 are the effects of the dimensions that do not operate through the specific attitude measures included in $\mathbf{A_{in}}$

Results

Schools and attitudes.

Tables 7.5 through 7.7 display the results from the models estimating the relationship between school characteristics and individual's attitudes. The coefficients displayed are the multiplicative effects on the odds of holding that attitude. An exponentiated coefficient greater than 1.00 represents a positive effect, less than 1.00 a negative effect, and equal to 1.00 no effect. Table 7.5 presents the models of school

[38] Because the first month of the prospective data collection includes information regarding women's contraceptive use between the date of their individual interview, which occurred sometime between July and December 1996, and February 1997 I include an additional control for whether the specific person-month was this irregular, potentially long month. This variable equals one if the person-month was this first month and zero otherwise.

characteristics during childhood on a measure of the respondent's attitude regarding household decision making. Columns 1 through 5 show the models with the measures of the school closest to the respondent's neighborhood and columns 6 through 10 show those with the geographically weighted measures of all the schools open in the area. Looking at Models 1 through 5 we see that only the proportion of teachers who are women at the school closest to the respondent at age 13 was significantly related to later contraceptive use. Women whose closest school had a larger proportion of female teachers were less likely to believe that a man should make most of the decisions in the household.

(Table 7.5, about here)

On the other hand, four of the geographically weighted measures of school quality were related to women's views about household decision making (Models 6-10). Only the measure of family planning curriculum was not statistically significant. In Model 7 we see that the geographically weighted average of proportion of teachers who are women when the respondent was 13 years old is negatively and significantly related to women's attitudes about household decision making. Again, women who had more exposure to larger proportions of female teachers were less likely to think that men should make household decisions.

Technically, a one unit increase in the geographically weighted average of the proportion of teachers who are women corresponds with a 56 percent lower likelihood of agreeing with this statement. However, a one unit increase in these geographically weighted averages is substantively a very large increase in exposure. For instance, if the proportion of teachers who are female increased by .25 at three schools located at the

northeastern end of the study area, close to the large town Narayangat, the neighborhood level mean of the geographically weighted average in 1995 would increase from 0.0485 to 0.0536 (not shown in tables). If those three schools were instead located in the southwestern end of the study area, the most remote region, the mean would increase to only 0.0487. As another example, consider the situation where three schools that had not offered a family planning curriculum began to offer one. If the three schools are located near Narayangat, the neighborhood level mean of the geographically weighted average would increase from 0.056 to 0.092 and if the schools were in the remote region of the study area the mean would increase to only 0.053. As you can see, it is unrealistic to think of individuals experiencing a full one-unit difference in these geographically weighted average measures. Substantively, it may be more realistic to consider the relationship to attitudes given a 0.10 unit increase. Having said that, when considering attitude measures as the outcome it is not at all clear what a .56 or .056 unit decrease in the likelihood of agreeing that men should make household decisions means in terms of the individual's actual attitude (what we would expect from a 1.00 or 0.10 unit increase in the geographically weighted average of family planning curriculum availability). Because of the ambiguity in the size and meaning of these effect estimates, in the remainder of this chapter I only discuss the direction of the relationship and not the magnitude.

Models 8-10 in Table 7.5 show the effects of exposure to teachers with higher education, female students, and fee requirements. All three school characteristics are negatively and significantly related to the attitude about household decision-making. Women who had more exposure to schools with larger proportions of college educated

teachers, female students, and with fee requirements, were less likely to think that men should make most of the decisions in the household.

There are a couple control measures worth commenting on at this point. First, women who had attended school were less likely to think that men should make household decisions. Second, other individual experiences and community characteristics before age 12 were not statistically related to women's attitudes regarding children's contribution to household work. Ethnicity was related to this attitude with Terai Tibeto-Burmese being more likely than Upper Caste Hindu to think that men should make the household decisions. Also noteworthy is that birth cohort was also significantly related to this measures of attitudes about children helping their parents—however the direction of this relationship was opposite to what I predicted. Women in the older cohorts were more likely to disagree with this attitude statement than women in the youngest cohort.

Table 7.6 shows the effect of school characteristics during childhood on the attitude regarding children's contribution to household labor. Looking at Models 1 through 5 we see that, again, only the proportion of teachers who are female at one's closest school is related to this attitude. Women for whom the school closest to their current neighborhood when they were 13 years old had a higher proportion of female teachers were less likely to report that having many children helped parents do their work. None of the other aspects of school quality at the closest school were related to this attitude.

(Table 7.6, about here)

In Models 6 through 10 we see that none of the geoweighted measure of exposures to school quality were significantly related to whether women strongly agreed

that having many kids helps parents do their work. However, when I keep this measure as ordinal all 5 geoweighted measures of school quality are significantly related to this attitude measure. I present the results from these models in Appendix A, Table A.1. Here we see that women with more exposure to higher quality schools are less likely to agree that having many children helps parents with their work. I show these results with the ordinal measure in an appendix because I use the dichotomous measure from Table 7.6 in the remaining analyses in this chapter. Table A.1 illustrates that, although I do not find a statistically significant relationship between school quality and the specific dichotomous measure of children's role in the household, there is still some evidence that school quality is related to this attitude and that it may still be a mechanism through which schools influence contraceptive use.

Returning to Table 7.6 and looking at the control measures we see that women who had more non-family experiences were less likely to agree that having many children helps parents with their work. This effect is largely due to the effect of having seen a movie (not shown in tables). It is worth noting that the relationship between school quality and this attitudes is entirely independent of the effect of non-family experiences. Removing the measure of non-family experiences from the model does not make the school quality effects in Table 7.6 statistically significant.

Finally, in Table 7.7 I show the last set of results for the models of attitudes—those for the attitude "It is better to have no children than to have a child who marries a spouse of a different caste." None of the measures of school quality for the closest school were statistically significant. All five of the geographically weighted measures of school quality for all the schools in the area were negatively and statistically significantly related

to this measure of the attitude that caste is very important. Women with more exposure to schools with family planning curricula, higher proportions of female students, high proportions of female and college educated teachers, and to schools with fees for first grade were more likely to disagree with the statement "It is better to have no children than to have a child who marries a spouse of a different caste."

(Table 7.7, about here)

Attitudes and contraceptive use.

Table 7.8 displays the results from the hazard models of the relationship between attitudes and contraceptive use. Because the frequency of events, contraceptive use, in any one month interval is quite small, the odds of contraceptive use are very similar to the rate, and I discuss the results in terms of rates. Models 1 through 3 show the separate effects for each of the three attitude measures included in these analyses. All three attitude measures are negatively and significantly related to the hazard of contraceptive use. This means that women who agree with the statements had lower rates of contraceptive use—a woman who reported that a man should make most of the decisions in the household used contraceptives later than women who said that men should not make most of the decisions.

(Table 7.8, about here)

In Model 4 I show the independent effects of the three attitude measures. All three measures maintain their statistical significance in this final combined model. The size of the effects also do not change in this combined model.

Several of the control variables bear commenting on. First, the effect of women's own education was in the opposite direction from that predicted by theory and previous

research. Women who went to school before age 13 had lower rates of contraceptive use than women who did not go to school. Interestingly, the effects of parents' education were also in the opposite direction from that predicted. However, women's other non-family experiences are positively related to the hazard of contraceptive use. Women who had more non-family experiences had higher rates of contraceptive use. Also, women in older birth cohorts had lower rates of contraceptive use than women in younger birth cohorts.

Schools and contraceptive use.

In Table 7.9 I show the results from models of the relationship between school quality and contraceptive use. Again, in Models 1 through 5 I show the relationship between the measures of the quality of the closest school and the hazard of contraceptive use. Only the proportion of female students was significantly related to the hazard of contraceptive use. Women whose closest school had a higher proportion of female students had higher rates of contraceptive use. Because this aspect of school quality was not related to any of the attitude measures (see Tables 7.5 through 7.7), these analyses do not support the idea that attitudes about familial roles are a mechanism through which the quality of one's closest school influence contraceptive use.

(Table 7.9, about here)

In models 6 through 10 we see the effects of the geographically weighted average of school characteristics at age 13 on the hazard of contraceptive use. All five measures of school characteristics were positively and significantly related to the hazard. Women with more exposure to schools with family planning curricula, higher proportions of female and college educated teachers, higher proportions of female students, and schools

with fees for first grade had higher rates of contraceptive use than women with less exposure. Because these aspects of school quality were also related to the attitudes I conduct one more set of analyses to empirically determine the degree to which these attitudes may be a mechanism through which schools influence individual behavior.

Attitudes. Table 7.10 presents the results of hazard models of contraceptive use with both measures of school characteristics and attitudes. The important conclusion from this table actually comes from comparing these results with those presented in Table 7.9, Models 6-10. By examining the decrease in the odds ratios for the measures of school characteristics from Table 7.9 when we include the measures of attitudes in Table 7.10 we can determine whether these attitude measures are a mechanism through which exposure to specific school characteristics influences contraceptive use.[39] For Model 1 in Table 7.10, the effect of exposure to schools with family planning curricula only decreases from 1.32 in Table 7.9, Model 6 to 1.31 in Table 7.10. That is, roughly 3 percent of the effect of increased exposure to schools with family planning curricula during childhood on contraceptive use is through these three measures of attitudes. The odds ratios for the other geoweighted measures of school characteristics decrease by even larger percentages when the three attitude measures are added to the models. The effect of female teachers is reduced by about 10 percent, that of college-educated teachers by about 14 percent, that of the proportion of female students by 5 percent, and the odds ratio for the measure of fees for first grade decreased by 7 percent when these attitude measures were included in the model.

(Table 7.10, about here)

[39] We do not know if these two odds ratios are statistically different from one another.

The majority of these decreases are due to including the measure of women's attitudes regarding household decision-making. For instance, including this attitude measure alone in the model reduces the effect of exposure to college-educated teachers by 5 percent, whereas including either of the other attitude measures reduces this effect by only 1 percent each (not in tables).

Including the ordinal measure of the attitude about children's role in the household instead of the dichotomous measure produces results for the school quality effects virtually identical to those shown in Table 7.10 (see Appendix A, Table A.2).

It is also worth noting the odds ratios for the attitude measures do not change from Table 7.8, Model 4 when you include the school characteristics in the model. As mentioned above in the methodological section, because I am not able to determine when a specific attitude was formed I am forced to rely on my theoretical framework to distinguish between whether the attitudes are a mechanism through which schools influence contraceptive use or whether school characteristics are a mechanism through which attitudes influence contraceptive use. There are two additional features of these analyses that support my interpretation that the former causal relationship is more appropriate. First, the measures of school characteristics refer to a period many years before the attitudes were measured. Even if attitudes begin to take shape quite early, it is unlikely that the attitudes as they were in 1996 influenced the specific aspects of school quality many years previously. Second, the effect estimates for the attitude measures are not affected by including school characteristics in the model. This is some empirical evidence to support my theoretically driven hypotheses regarding the specific causal relationship in question.

Discussion

This chapter provides new information about the complex relationship between school context and individual behavior. By empirically examining the relationship between specific aspects of school quality, attitudes about families and familial roles, and actual contraceptive use this research gives insight into the specific attitudinal and programmatic mechanisms through which individuals are influenced by their surroundings.

There are three broad conclusions the reader should take away from this chapter. First, the results in this chapter indicate that school quality—specifically curriculum, teacher and student characteristics, and required supplemental fees—are related to individuals' contraceptive use. These school quality effects are what we would expect given previous findings that 1) these aspects of higher school quality increase students' academic outcomes and 2) that higher academic outcomes are associated with lower fertility and increased contraceptive use. Importantly, this research also shows that these effects on contraceptive use are independent of the individuals' own educational experiences. In this chapter, I investigated the relationship between these dimensions of school quality and individuals' attitudes and contraceptives for all women in the community, not just those who attended school—a unique contribution to the literature on school effects. By controlling for women's own educational enrollment I show that the effects of school quality are independent of it. This has important implications for understanding the wide range of effects that schools may have in a community. For instance, when policy makers are deciding whether to invest in additional teacher training

programs they should consider the benefits these teachers have on both students and non-student community members.

Second, these results provide evidence that school quality is related to women's attitudes about familial roles. Specifically, the analyses presented here demonstrate that family planning curricula, women and better educated teachers, a larger presence of girl students, and fee requirements for first grade are all related to women having less family-oriented attitudes about roles and responsibilities. These aspects of school quality appear to increase support of women's autonomy in decision making, of new roles for children with less connection to household production, and of self-determination or less constraint by historical social roles.

From these two conclusions comes the third. The results presented in this chapter indicate that school context is related to individual behavior through both programmatic, or structural, factors and through ideational factors. In examining how specific aspects of school quality are related to individuals' behavior I demonstrate that curriculum, characteristics of the teachers, the make up of the student body, and the status of the school in the community are all programmatic mechanisms through which schools influence contraceptive behavior. This short list of school characteristics probably does not capture all relevant aspects of school quality and it is likely that there are other important ones. However, this research is an important step in identifying the most influential dimensions of school quality. In other analyses not presented in this chapter I estimated effects of other aspects of school quality such as who supplied the funding for the school construction, student-teacher ratios, and the number of grades offered at the

school. I did not find significant relationships between these aspects of school quality and attitudes and contraceptive use.

This research also supports the theoretical proposition that ideational mechanisms are at least partly responsible for the effect of changing social context on individual behavior. These analyses demonstrate that some proportion of the effect of teacher characteristics on contraceptive use is through ideas about familial roles. These attitudes appear to be an important component of individuals' decision-making processes. Including only three measures of three different attitudes in these models explained as much as 14 percent of the effect of the proportion of teachers who are women or have a college degree on contraceptive use. It is likely that additional measures of these or different attitudes will account for an even larger percent of these school characteristics.

Of course, it is also likely that large proportions of the effects of school quality will not be explained away by changes in attitudes. Other mechanisms such as increased access to education and employment opportunities are likely working simultaneously with the ideational mechanisms. In this chapter we saw that essentially none of the effects of family planning curricula or fee requirements were due to the three attitude measures examined here. This may be because of the specific measures of the attitudes I used in these analyses. Or, the effect of family planning curriculum and fees may influence contraceptive use through other attitudes.

A final important conclusion from these analyses concerns the effects of the closest school compared with a broader conceptualization of school. In virtually all of the analyses shown here the school characteristics of the closest school were not significantly related to women's attitudes or their later contraceptive use. Remembering that the focus

of these analyses was on how exposure to school characteristics and not actual experiences with those characteristics influences individuals, these results provide evidence that for exposure effects the broader educational context is important. Because these exposure effects influence individuals through a range of social channels, physical proximity is less important.

This is not at all to say that what is available nearby has no influence on individuals. In fact, the geographically weighted measures I investigate here place greater weight on those schools that are closer to the individual. Also, the proportion of female teachers and students at the closest school were significantly related to individuals' attitudes and contraceptive use (further supporting the importance of role modeling as a mechanism). These results do show that it is important consider more than just those schools located closest to the individual when examining the full effects of schools and school characteristics in the community.

Table 7.1. Descriptive Statistics	Mean	SD	Min	Max
Attitudes				
A man should make most of the decisions in the household.	0.64		0	1
Some people think that having many children would help parents do their work.	0.33		0	1
It is better to have no children than to have a child who marries a spouse of a different caste.	0.53		0	1
Controls				
Individual experiences				
Went to school before age 13	0.67		0	1
Index of non-family experiences before age 13	0.98	0.86	0	4
Community characteristics (community lived in before age 12)				
Index of number of non-family organization in community	2.93	1.31	0	4
Lived in 1996 neighborhood when aged 13	0.38		0	1

N=1,226 women.

Table 7.2. Descriptive Statistics School Quality Measures, School level

	N	Mean	Min	Max
Has family planning curriculum				
1954	2	0	0	0
1995	123	0.15	0	1
Proportion of teachers who are female				
1954	2	0	0	0
1995	123	0.22	0	1
Proportion of teachers with at least a college degree				
1954	2	0	0	0
1995	123	0.18	0	1
Proportion of students who are female				
1954	2	0.07	0.03	0.10
1995	123	0.46	0.14	0.67
Has fee for 1st grade				
1954	2	0.00	0	0
1995	123	0.94	0	1

Table 7.3. Descriptive Statistics School Quality Measures, Closest School, Neighborhood Level

	Mean	SD	Min	Max
Has family planning curriculum				
1954	0.00		0.00	0.00
1995	0.27		0.00	1.00
Proportion of teachers who are female				
1954	0.00		0.00	0.00
1995	0.14	0.16	0.00	0.53
Proportion of teachers with at least a college degree				
1954	0.00		0.00	0.00
1995	0.19	0.23	0.00	1.00
Proportion of students who are female				
1954	0.09	0.02	0.03	0.10
1995	0.47	0.10	0.00	0.63
Has fee for 1st grade				
1954	0.00		0.00	0.00
1995	0.95		0.00	1.00

N=171 neighborhoods

Table 7.4. Descriptive Statistics School Quality Measures, Individual Level at Age 13

Panel A. Closest School	Mean	SD	Min	Max
Has family planning curriculum	0.19	0.39	0	1.00
Proportion of teachers who are female	0.11	0.16	0	1.00
Proportion of teachers with at least a college degree	0.11	0.18	0	1.00
Proportion of students who are female	0.39	0.13	0	0.82
Has fee for 1st grade	0.83	0.37	0	1.00

Panel B. Geographically weighted average of all schools	Mean	SD	Min*	Max
Has family planning curriculum	0.06	0.28	0	3.52
Proportion of teachers who are female	0.03	0.12	0.00	1.59
Proportion of teachers with at least a college degree	0.04	0.13	0.00	1.98
Proportion of students who are female	0.13	0.38	0.00	4.79
Has fee for 1st grade	0.06	0.21	0.00	3.50

*When zero has two decimal places minimum values are not exactly zero, they are numbers slightly larger than zero that become zero when only two significant digits are shown.

N=1,226 women

Table 7.5. Multilevel Logistic Regression: Schools and Attitudes: A man should make most of the decisions in the household.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
School characteristics										
Has family planning curriculum	0.85 (-0.94)					0.84 (-0.78)				
Proportion of teachers who are female		0.52+ (-1.58)					0.44+ (-1.46)			
Proportion of teachers with at least a college degreee			1.09 (0.22)					0.36* (-1.84)		
Proportion of students who are female				0.95 (-0.08)					0.78+ (-1.41)	
Has fee for 1st grade					1.04 (0.21)					0.9+ (-1.39)
Controls										
Individual experiences										
Went to school before age 13	0.59** (-2.92)	0.59** (-2.96)	0.59** (-2.98)	0.59** (-2.95)	0.58** (-2.98)	0.59** (-2.93)	0.59** (-2.91)	0.59** (-2.94)	0.59** (-2.93)	0.59** (-2.92)
Index of non-family experiences before age 13	0.92 (-0.99)	0.92 (-0.96)	0.92 (-1.06)	0.92 (-1.04)	0.92 (-1.05)	0.92 (-1.02)	0.92 (-1.01)	0.92 (-1.01)	0.92 (-1.02)	0.92 (-1.01)
Community characteristics (community lived in before age 12)										
Index of number of non-family organization in community	0.99 (-0.1)	1 (-0.07)	0.99 (-0.1)	0.99 (-0.1)	0.99 (-0.1)	0.99 (-0.11)	0.99 (-0.1)	0.99 (-0.11)	0.99 (-0.11)	0.99 (-0.1)
Parental characteristics										
Father ever went to school	0.91 (-0.69)	0.91 (-0.65)	0.9 (-0.72)	0.9 (-0.72)	0.9 (-0.71)	0.91 (-0.69)	0.91 (-0.66)	0.91 (-0.63)	0.91 (-0.66)	0.91 (-0.66)
Father ever worked for pay outside the family	1 (0)	1 (0.01)	0.99 (-0.06)	0.99 (-0.05)	0.99 (-0.04)	1 (0)	1.01 (0.07)	1.02 (0.12)	1.01 (0.08)	1.01 (0.08)
Mother ever went to school	0.97 (-0.12)	0.98 (-0.09)	0.97 (-0.14)	0.97 (-0.14)	0.97 (-0.14)	0.97 (-0.13)	0.97 (-0.15)	0.97 (-0.14)	0.97 (-0.15)	0.97 (-0.15)
Mother's children ever born	0.98 (-0.91)	0.98 (-0.86)	0.98 (-0.88)	0.98 (-0.88)	0.98 (-0.89)	0.98 (-0.87)	0.98 (-0.86)	0.98 (-0.85)	0.98 (-0.85)	0.98 (-0.85)

(cont.)

Table 7.5. Multilevel Logistic Regression: Schools and Attitudes: A man should make most of the decisions in the household.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
Parental characteristics continued	1.03	1.04	1.03	1.03	1.03	1.03	1.04	1.05	1.04	1.04
Parents ever used contraceptives	(0.2)	(0.28)	(0.21)	(0.21)	(0.2)	(0.24)	(0.3)	(0.33)	(0.29)	(0.28)
Ethnicity[a]										
Low caste Hindu	1.36+	1.31	1.35+	1.35+	1.35+	1.34+	1.33	1.32	1.32	1.32
	(1.39)	(1.21)	(1.33)	(1.33)	(1.33)	(1.31)	(1.27)	(1.23)	(1.25)	(1.25)
Newar	0.87	0.87	0.84	0.84	0.84	0.84	0.84	0.83	0.84	0.84
	(-0.6)	(-0.58)	(-0.75)	(-0.74)	(-0.74)	(-0.73)	(-0.72)	(-0.76)	(-0.75)	(-0.73)
Hill Tibeto-Burmese	1.18	1.17	1.19	1.18	1.19	1.18	1.16	1.16	1.16	1.16
	(0.87)	(0.82)	(0.88)	(0.87)	(0.88)	(0.83)	(0.77)	(0.75)	(0.77)	(0.78)
Terai Tibeto-Burmese	1.77**	1.78**	1.81**	1.8**	1.8**	1.79**	1.77**	1.75**	1.76**	1.76**
	(2.84)	(2.86)	(2.95)	(2.94)	(2.92)	(2.9)	(2.83)	(2.77)	(2.8)	(2.8)
Lived in this neighborhood before age 13	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.08	1.08	1.07
	(0.5)	(0.53)	(0.53)	(0.52)	(0.51)	(0.51)	(0.47)	(0.48)	(0.48)	(0.48)
Birth cohort[b]										
Born 1976-1972 (age 20-24 in 1996)	0.8	0.8+	0.8	0.8	0.8	0.8	0.79+	0.8+	0.8	0.8
	(-1.25)	(-1.31)	(-1.28)	(-1.28)	(-1.25)	(-1.27)	(-1.32)	(-1.29)	(-1.28)	(-1.27)
Born 1971-1967 (age 25-29 in 1996)	0.66*	0.65*	0.66*	0.66*	0.66*	0.66*	0.66*	0.66*	0.67*	0.67*
	(-1.9)	(-2)	(-1.91)	(-1.91)	(-1.89)	(-1.88)	(-1.92)	(-1.92)	(-1.86)	(-1.87)
Born 1966-1952 (age 30-44 in 1996)	0.63*	0.65*	0.65*	0.64*	0.65*	0.65*	0.65*	0.64*	0.65*	0.66*
	(-2.01)	(-1.88)	(-1.92)	(-1.79)	(-1.87)	(-1.9)	(-1.87)	(-1.96)	(-1.88)	(-1.84)
ICC	0.09	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
N	1226	1226	1226	1226	1226	1226	1226	1226	1226	1226

[a]Reference category is Upper caste Hindu.

[b]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 7.6. Multilevel Logistic Regression: Schools and Attitudes: Some people think that having many children would help parents do their work.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
School characteristics										
Has family planning curriculum	0.91 (-0.52)					0.78 (-0.83)				
Proportion of teachers who are female		0.21*** (-3.32)					0.5 (-0.97)			
Proportion of teachers with at least a college degreee			1.46 (0.99)					0.52 (-0.95)		
Proportion of students who are female				0.5 (-1.1)					0.8 (-0.98)	
Has fee for 1st grade					0.89 (-0.6)					0.9 (-1.02)
Controls										
Individual experiences										
Went to school before age 13	1 (0.02)	0.99 (-0.07)	0.99 (-0.04)	1.02 (0.1)	1 (0.02)	1.01 (0.04)	1.01 (0.03)	1 (0.02)	1.01 (0.03)	1.01 (0.03)
Index of non-family experiences before age 13	0.84* (-2.03)	0.85* (-1.9)	0.83* (-2.11)	0.84* (-2.03)	0.84* (-2.02)	0.84* (-2.02)	0.84* (-2.03)	0.84* (-2.04)	0.84* (-2.03)	0.84* (-2.03)
Community characteristics (community lived in before age 12)										
Index of number of non-family organization in community	0.94 (-1.05)	0.95 (-0.9)	0.94 (-1.06)	0.95 (-0.99)	0.94 (-1.05)	0.94 (-1.05)	0.94 (-1.05)	0.94 (-1.05)	0.94 (-1.05)	0.94 (-1.05)
Parental characteristics										
Father ever went to school	0.85 (-1.06)	0.87 (-0.93)	0.85 (-1.09)	0.85 (-1.06)	0.85 (-1.09)	0.86 (-1.04)	0.86 (-1.03)	0.86 (-1.02)	0.86 (-1.02)	0.86 (-1.02)
Father ever worked for pay outside the family	1.24+ (1.61)	1.26* (1.71)	1.23+ (1.56)	1.24+ (1.63)	1.24+ (1.58)	1.25+ (1.64)	1.25* (1.67)	1.25* (1.67)	1.25* (1.67)	1.25* (1.68)
Mother ever went to school	1.49* (1.79)	1.52* (1.85)	1.49* (1.79)	1.48* (1.75)	1.5* (1.8)	1.49* (1.77)	1.48* (1.75)	1.48* (1.76)	1.48* (1.75)	1.48* (1.75)
Mother's children ever born	1.01 (0.36)	1.01 (0.47)	1.01 (0.4)	1.01 (0.41)	1.01 (0.39)	1.01 (0.39)	1.01 (0.39)	1.01 (0.39)	1.01 (0.4)	1.01 (0.4)

(cont.)

Table 7.6. Multilevel Logistic Regression: Schools and Attitudes: Some people think that having many children would help parents do their work.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
Parental characteristics continued										
Parents ever used contraceptives	0.89	0.92	0.9	0.89	0.89	0.9	0.9	0.9	0.9	0.9
	(-0.77)	(-0.57)	(-0.72)	(-0.75)	(-0.76)	(-0.72)	(-0.7)	(-0.7)	(-0.71)	(-0.71)
Ethnicity[a]										
Low caste Hindu	1.61*	1.52*	1.58*	1.61*	1.6*	1.59*	1.58*	1.58*	1.57*	1.57*
	(2.13)	(1.87)	(2.05)	(2.15)	(2.11)	(2.08)	(2.05)	(2.05)	(2.03)	(2.03)
Newar	1.43+	1.53*	1.39+	1.39	1.42+	1.41+	1.41+	1.4+	1.41+	1.41+
	(1.4)	(1.66)	(1.29)	(1.27)	(1.37)	(1.35)	(1.35)	(1.33)	(1.33)	(1.34)
Hill Tibeto-Burmese	1.21	1.2	1.21	1.19	1.22	1.2	1.2	1.2	1.19	1.19
	(0.96)	(0.92)	(0.95)	(0.87)	(0.98)	(0.91)	(0.89)	(0.9)	(0.88)	(0.88)
Terai Tibeto-Burmese	2.78***	2.75***	2.88***	2.79***	2.84***	2.78***	2.77***	2.76***	2.75***	2.75***
	(5.4)	(5.38)	(5.54)	(5.44)	(5.5)	(5.42)	(5.38)	(5.37)	(5.34)	(5.34)
Lived in this neighborhood before age 13	1.34*	1.35*	1.35*	1.34*	1.34*	1.33*	1.33*	1.33*	1.33*	1.33*
	(1.9)	(1.96)	(1.96)	(1.91)	(1.93)	(1.88)	(1.86)	(1.87)	(1.86)	(1.86)
Birth cohort[b]										
Born 1976-1972 (age 20-24 in 1996)	0.46***	0.45***	0.46***	0.45***	0.45***	0.46***	0.46***	0.46***	0.46***	0.46***
	(-4.17)	(-4.3)	(-4.2)	(-4.29)	(-4.23)	(-4.17)	(-4.21)	(-4.19)	(-4.18)	(-4.17)
Born 1971-1967 (age 25-29 in 1996)	0.54**	0.52**	0.55**	0.52**	0.53**	0.55**	0.54**	0.54**	0.55**	0.55**
	(-2.67)	(-2.84)	(-2.59)	(-2.83)	(-2.73)	(-2.63)	(-2.67)	(-2.67)	(-2.63)	(-2.62)
Born 1966-1952 (age 30-44 in 1996)	0.63*	0.64*	0.65*	0.56*	0.62*	0.64*	0.64*	0.64*	0.64*	0.65*
	(-1.99)	(-1.9)	(-1.86)	(-2.24)	(-2.04)	(-1.91)	(-1.91)	(-1.96)	(-1.91)	(-1.88)
ICC	0.04	0.03	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04
N	1226	1226	1226	1226	1226	1226	1226	1226	1226	1226

[a]Reference category is Upper caste Hindu.

[b]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 7.7. Multilevel Logistic Regression: Schools and Attitudes: It is better to have no children than to have a child who marries a spouse of a different caste.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
School characteristics										
Has family planning curriculum	0.9 (-0.63)					0.66* (-1.66)				
Proportion of teachers who are female		0.78 (-0.64)					0.32* (-1.88)			
Proportion of teachers with at least a college degreee			0.74 (-0.84)					0.35* (-1.81)		
Proportion of students who are female				0.86 (-0.25)					0.74* (-1.68)	
Has fee for 1st grade					1.2 (1.09)					0.87* (-1.72)
Controls										
Individual experiences										
Went to school before age 13	0.91 (-0.56)	0.9 (-0.6)	0.91 (-0.58)	0.91 (-0.57)	0.9 (-0.64)	0.92 (-0.51)	0.92 (-0.52)	0.91 (-0.56)	0.91 (-0.54)	0.91 (-0.54)
Index of non-family experiences before age 13	0.98 (-0.22)	0.98 (-0.23)	0.99 (-0.18)	0.98 (-0.26)	0.98 (-0.3)	0.98 (-0.22)	0.98 (-0.22)	0.98 (-0.23)	0.98 (-0.23)	0.98 (-0.23)
Community characteristics (community lived in before age 12)										
Index of number of non-family organization in community	0.97 (-0.57)	0.97 (-0.55)	0.97 (-0.59)	0.97 (-0.56)	0.97 (-0.6)	0.97 (-0.58)	0.97 (-0.57)	0.97 (-0.58)	0.97 (-0.58)	0.97 (-0.57)
Parental characteristics										
Father ever went to school	0.93 (-0.56)	0.93 (-0.55)	0.93 (-0.57)	0.92 (-0.58)	0.93 (-0.55)	0.93 (-0.51)	0.93 (-0.5)	0.94 (-0.49)	0.93 (-0.5)	0.93 (-0.5)
Father ever worked for pay outside the family	0.93 (-0.54)	0.93 (-0.56)	0.93 (-0.55)	0.93 (-0.57)	0.93 (-0.55)	0.94 (-0.47)	0.95 (-0.42)	0.95 (-0.41)	0.95 (-0.43)	0.95 (-0.42)
Mother ever went to school	1.2 (0.86)	1.2 (0.86)	1.2 (0.85)	1.19 (0.84)	1.19 (0.82)	1.2 (0.85)	1.19 (0.83)	1.2 (0.85)	1.19 (0.83)	1.19 (0.83)
Mother's children ever born	0.96+ (-1.55)	0.96+ (-1.52)	0.96+ (-1.55)	0.96+ (-1.52)	0.96+ (-1.55)	0.96+ (-1.5)	0.96+ (-1.49)	0.96+ (-1.5)	0.96+ (-1.49)	0.96+ (-1.49)

(cont.)

Table 7.7. Multilevel Logistic Regression: Schools and Attitudes: It is better to have no children than to have a child who marries a spouse of a different caste.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
Parental characteristics continued										
Parents ever used contraceptives	0.79*	0.79*	0.78*	0.79*	0.79*	0.8*	0.8+	0.8+	0.8+	0.8+
	(-1.74)	(-1.7)	(-1.77)	(-1.73)	(-1.75)	(-1.65)	(-1.62)	(-1.61)	(-1.63)	(-1.64)
Ethnicity[a]										
Low caste Hindu	0.97	0.95	0.96	0.96	0.96	0.95	0.94	0.94	0.94	0.94
	(-0.15)	(-0.25)	(-0.17)	(-0.19)	(-0.21)	(-0.25)	(-0.3)	(-0.31)	(-0.31)	(-0.31)
Newar	0.85	0.85	0.84	0.83	0.83	0.84	0.84	0.83	0.83	0.83
	(-0.68)	(-0.71)	(-0.72)	(-0.78)	(-0.8)	(-0.75)	(-0.75)	(-0.79)	(-0.78)	(-0.77)
Hill Tibeto-Burmese	0.86	0.85	0.86	0.85	0.85	0.84	0.84	0.84	0.84	0.84
	(-0.83)	(-0.84)	(-0.81)	(-0.84)	(-0.84)	(-0.92)	(-0.96)	(-0.96)	(-0.95)	(-0.95)
Terai Tibeto-Burmese	0.45***	0.46***	0.45***	0.46***	0.45***	0.45***	0.45***	0.44***	0.44***	0.44***
	(-4.25)	(-4.26)	(-4.27)	(-4.23)	(-4.26)	(-4.34)	(-4.39)	(-4.41)	(-4.4)	(-4.4)
Lived in this neighborhood before age 13	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.08	1.08	1.08
	(0.55)	(0.57)	(0.51)	(0.56)	(0.52)	(0.53)	(0.5)	(0.53)	(0.51)	(0.51)
Birth cohort[b]										
Born 1976-1972 (age 20-24 in 1996)	1	1	1	1	1.02	1.01	0.99	1	1	1
	(0.03)	(-0.01)	(0.01)	(-0.03)	(0.11)	(0.04)	(-0.04)	(0.01)	(0.01)	(0.02)
Born 1971-1967 (age 25-29 in 1996)	0.84	0.83	0.82	0.83	0.86	0.85	0.84	0.84	0.85	0.85
	(-0.84)	(-0.88)	(-0.92)	(-0.89)	(-0.73)	(-0.75)	(-0.83)	(-0.82)	(-0.77)	(-0.77)
Born 1966-1952 (age 30-44 in 1996)	1.01	1.03	1	0.99	1.07	1.04	1.04	1.02	1.04	1.05
	(0.05)	(0.12)	(0.02)	(-0.03)	(0.3)	(0.19)	(0.2)	(0.09)	(0.18)	(0.22)
ICC	0.07	0.06	0.07	0.06	0.07	0.06	0.06	0.06	0.06	0.06
N	1226	1226	1226	1226	1226	1226	1226	1226	1226	1226

[a]Reference category is Upper caste Hindu.

[b]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table 7.8. Multilevel Hazard Model Estimates:Attitudes and Contraceptive Use

	1	2	3	4
Attitudes				
A man should make most of the decisions in the household.	0.84* (-2.21)			0.86* (-1.82)
Some people think that having many children would help parents do their work.		0.83* (-2.15)		0.85* (-1.87)
It is better to have no children than to have a child who marries a spouse of a different caste.			0.85* (-2.18)	0.88* (-1.71)
Controls[a]				
Individual experiences				
Went to school before age 13	0.77 (-2.42)	0.78 (-2.32)	0.78 (-2.32)	0.76 (-2.49)
Index of non-family experiences before age 13	1.11* (2.13)	1.11* (2.01)	1.12* (2.26)	1.1* (1.96)
Community characteristics (community lived in before age 12)				
Index of number of non-family organization in community	1.04 (1.06)	1.04 (1.08)	1.04 (1.04)	1.04 (1.06)
Parental characteristics				
Father ever went to school	0.86 (-1.7)	0.86 (-1.73)	0.85 (-1.79)	0.85 (-1.84)
Father ever worked for pay outside the family	1.16* (1.85)	1.18* (2.03)	1.15* (1.74)	1.17* (1.95)
Mother ever went to school	0.85 (-1.23)	0.86 (-1.13)	0.87 (-1.02)	0.87 (-1.05)
Mother's children ever born	0.97+ (-1.53)	0.97+ (-1.52)	0.97* (-1.7)	0.97* (-1.66)
Parents ever used contraceptives	1.04 (0.48)	1.04 (0.42)	1.03 (0.37)	1.03 (0.35)
Ethnicity[b]				
Low caste Hindu	1.07 (0.45)	1.07 (0.5)	1.06 (0.43)	1.09 (0.62)
Newar	1.2 (1.11)	1.22 (1.23)	1.2 (1.12)	1.21 (1.18)
Hill Tibeto-Burmese	1.27* (1.88)	1.27* (1.86)	1.25* (1.75)	1.27* (1.87)
Terai Tibeto-Burmese	0.72** (-2.34)	0.74* (-2.2)	0.69** (-2.65)	0.73* (-2.24)
Lived in this neighborhood before age 13	0.76** (-2.48)	0.76** (-2.43)	0.76** (-2.5)	0.76** (-2.51)
Birth cohort[c]				
Born 1976-1972 (age 20-24 in 1996)	1.21* (1.75)	1.19* (1.65)	1.23* (1.96)	1.19* (1.67)
Born 1971-1967 (age 25-29 in 1996)	0.88 (-0.91)	0.89 (-0.83)	0.9 (-0.74)	0.88 (-0.98)
Born 1966-1952 (age 30-44 in 1996)	0.35*** (-6.76)	0.36*** (-6.65)	0.37*** (-6.55)	0.35*** (-6.75)
ICC	0.16	0.16	0.17	0.16
Person months	66422	66422	66422	66422

[a]Includes dummies for calendar month and year and for first month of prospective data collection.

[b]Reference category is Upper caste Hindu.

[c]Reference group is born 1981-1977 (age 15-29 in 1996).

+ P < .10, one tailed test; * P < .05, one tailed test; ** P < .01, one tailed test; *** P < .001, one tailed test

Table 7.9. Multilevel Hazard Model Estimates: Schools and Contraceptive Use[a]

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
School characteristics										
Has family planning curriculum	1.15					1.32+				
	(1.27)					(1.61)				
Proportion of teachers who are female		1.24					2.12*			
		(0.73)					(1.92)			
Proportion of teachers with at least a college degreee			1.26					2.05*		
			(0.95)					(2.21)		
Proportion of students who are female				3.13**					1.37**	
				(2.73)					(2.55)	
Has fee for 1st grade					1.04					1.15**
					(0.33)					(2.44)
ICC	0.16	0.17	0.16	0.17	0.16	0.16	0.16	0.16	0.16	0.16
Person months	66422	66422	66422	66422	66422	66422	66422	66422	66422	66422

[a]Includes all controls described in text.

+ P < .10, one tailed test; * P < .05, one tailed test; ** P < .01, one tailed test; *** P < .001, one tailed test

Table 7.10. Multilevel Hazard Model Estimates: Schools, Attitudes, and Contraceptive Use[a]

	1	2	3	4	5
Schools (geoweighted average of neighborhood when respondent age 13)					
Has family planning curriculum	1.31+ (1.54)				
Proportion of teachers who are female		2.01* (1.8)			
Proportion of teachers with at least a college degreee			1.9* (1.97)		
Proportion of students who are female				1.35** (2.43)	
Has fee for 1st grade					1.14** (2.34)
Attitudes					
A man should make most of the decisions in the household.	0.87* (-1.81)	0.87* (-1.77)	0.87* (-1.69)	0.87* (-1.73)	0.87* (-1.75)
Some people think that having many children would help parents do their work.	0.85* (-1.85)	0.85* (-1.84)	0.85* (-1.84)	0.85* (-1.85)	0.85* (-1.85)
It is better to have no children than to have a child who marries a spouse of a different caste.	0.88* (-1.68)	0.88* (-1.68)	0.88* (-1.68)	0.88* (-1.68)	0.88* (-1.68)
ICC	0.16	0.16	0.16	0.16	0.16
Person months	66422	66422	66422	66422	66422

[a]Includes all controls described in text.

+ P < .10, one tailed test; * P < .05, one tailed test; ** P < .01, one tailed test; *** P < .001, one tailed test

CHAPTER 8

DISCUSSION

This concluding chapter provides a brief discussion of what we learn from this dissertation as a whole and how that is important for social theories, empirical models, policies, and future research agendas. This dissertation focuses on both programmatic and social-psychological mechanisms through which social context influences individual behavior. I examine the complex relationship between exposure to specific health services and aspects of school quality, attitudes from multiple domains, and individuals' contraceptive use behavior. The results provide new evidence regarding these mechanisms and inform theories about the broad macro-micro link.

In this chapter I discuss some of the broadest conclusions. Each of the three analytic chapters have important specific conclusions and detailed discussions of these findings and their implications can be found at the end of each chapter. I do not repeat them here. Rather, I provide a very brief summary of some of the important findings from this dissertation and then look across chapters to discern more global conclusions. In this chapter I first comment on some limitations of these analyses, then I provide a brief review of each of the analytic chapters, and I close with these broader conclusions.

Causal inference. Before I discuss some of these more important specific conclusions, the ability to make causal inferences based on these results bears commenting on. As with most social science research, this ability is limited. Health

service providers and schools are not randomly assigned to certain areas, nor are the services offered or school characteristics randomly assigned. Although my theoretical framework predicts that health services and schools influence individuals' attitudes and behavior, and not that individuals' attitudes and behavior influence the specific health services and schools, from the analyses presented in this dissertation I am not able to determine which case is true. The findings observed here may appear because individuals who are more likely to use contraception are also more likely to work to have health services or schools built or to have them provide specific services (Caldwell 1986). In this case, for example, it is not that the provision of child health services or higher percentages of female students increase women's contraceptive use, but rather that the women's contraceptive use, or something else about the women who will use contraception, results in the provision of child health service or larger proportions of girls enrollment in school.

In an attempt to minimize the chances that the observed effects are due to the later situation, I incorporate specific methodological tools into my analyses. First, I use the temporal ordering embedded in these data to help identify causal direction. Because the contraceptive use in my models necessarily occurs after the measures of health services and schools it is not possible that the contraceptive use itself caused that aspect of social context. Second, to address the possibility that there may be something special about women who use contraception (or the communities those women live in) that causes both the provision of health services or school qualities and women's contraceptive use, I include extensive controls for those individual and community level characteristics that theory points to as possible factors. This includes numerous parental and childhood

factors as well as key measures of community structures and services. Of course, the list of potential omitted variables is limitless, but the analyses presented here are robust to the inclusion of measures of those most prominent in the theory. Third, I estimate multilevel random effects models. These models are an additional step in attempting to control for any community level factors that may be causing the observed effects and are commonly used in the literature (Angeles, Guilkey, Mroz 1998; Axinn and Barber 2001; Browning, Leventhal, and Brooks-Gunn 2004; Yabiku 2004).

Any causal inferences are further limited because attitudes are also not randomly assigned to individuals, nor can they ever be. For all attitude measures we should therefore think about other potential explanations for the findings presented here. Perhaps most important when considering the policy implications of these attitude relationships is that women may express these attitudes because they believe they will use contraceptives in the future and want to create a sense of cognitive consistency across their life course. That is, the intention or plan to use contraception may exist first and then women articulate their attitude to be in line with that plan. This scenario may demand a different policy approach than one where the attitude is formed early on and then influences the behavior.

For example, in the latter case, where the attitude is formed and then influences subsequent intentions and behavior, policies and programs that focus on increasing school attendance may influence contraceptive use through the following chain: children spend more time attending school and less time on the family farm working; parents reassess the contribution children make to household production and start thinking that having many children will not help them with their work; parents use contraception. On

the other hand, if the first case is true, where the intention exists prior to the attitude formation or articulation, then parents will already be planning to use or not use contraception and increasing school attendance will not change their likelihood of using contraception.

Since it is not possible to randomly assign attitudes to individuals, future data collection efforts should gather information on individual's attitudes at multiple points across the life course. Having multiple measures, especially measures early in the life course, would allow the researcher to test hypotheses regarding the timing of attitude formation and specifically when the attitudes that ultimately influence behavior are formed. This information can in turn help researchers and policy makers better understand the processes of attitudinal and behavioral change and design more appropriate, efficient programs and policies.

Chapter 5. Chapter 5 provides evidence that attitudes from multiple domains are related to women's contraceptive use behavior. Women's attitudes about contraception, children, family, work, and employment were all related to their actual contraceptive use. Furthermore, women's attitudes about children and family had strong effects independent from those of attitudes about contraception indicating that these less closely connected attitudes play an integral part in women's contraceptive use decision-making processes.

Chapter 6. The results from Chapter 6 demonstrate that increased exposure to family planning, child, and maternal health service is related to higher rates of contraceptive use. By looking at the provision of these specific health services, these analyses provide evidence that the spread of health services may increase contraceptive use by providing new information about contraceptives, by changing the perception of

childhood to a period of investment, or by changing attitudes about women's roles and what defines a quality life for women. From the analyses on the health service context we also see evidence that women's attitudes about children and the importance of childbearing are a mechanism through which increased exposure to family planning, child, and maternal health services influences contraceptive use.

Chapter 7. The analyses of the relationship between school quality and contraceptive use suggest that the specific material taught in schools, the way that material is presented (based on teacher qualifications), mentoring, and positive peer influences are also ways in which schools influence contraceptive behavior. The findings from this chapter also constitute evidence that women's attitudes about roles and responsibilities within the family and society are mechanisms through which increased exposure teacher characteristics influence contraceptive use.

Broad conclusions. From all these analyses there are two key points the reader should take away. First, this dissertation provides multiple pieces of evidence attitudes are a mechanism through which social context influences individual behavior. This finding has important implications for both theory and future empirical research. Future researchers may want to motivate their research from a blended theoretical framework, similar to the one I present in Chapter 2. Second, to understand the full range of effects that changes in social context have on individual behavior we need to incorporate individuals' entire context into our theories and models. The analyses presented in this dissertation document that when looking at the effects of dimensions of social context it is not enough to examine individuals' own experiences with each dimension or exposure to only the closest aspect of each dimension. These models show that measures that

capture the full range of health services or aspects of school quality have strong, statistically significant effects on contraceptive use, even when measures of use of health services, school enrolment, or of the closest health service provider or school failed to have such effects. Unfortunately, our sociological theories have not developed to incorporate how context over space is related to individual behavior. Future theoretical work should address this weakness in order to provide guidance for empirical models.

This research is a first step in developing programs and policies for increasing contraceptive use and lowering fertility. Although based on analyses using a small, rural population in Nepal, the results presented here are relevant for researchers interested in other geographic areas as well. Given the similarity between Nepal and nearby countries, these results can be relevant to studies of contraceptive use in India, China, Bangladesh, and other Asian communities with similar demographic and economic patterns and concerns. For example, these results support the continued provision of family planning services both via health service providers and schools. Greater exposure to both services was related to higher rates of contraception. This provides some evidence that there is either still unmet need for contraception among this population or that family planning services and curricula actually change women's attitudes to be more accepting of contraceptive use and of particular methods.

This dissertation also provides evidence that mentoring and role modeling for women are potential ways to influence behavior. Hiring female teachers, or perhaps female workers in other industries, may influence community members' attitudes about women's roles and opportunities thereby changing their assessments of the costs and benefits of childbearing and contraceptive use. It may also be that having female

employees in the community or providing maternal health services influence women's contraceptive use by changing how both men and women define women's roles. Seeing women in new roles are learning about the importance of taking care of women's health issues may help to raise women's standing within their household and within the community.

Unfortunately, the analyses here do not allow me to ascertain which specific health services or dimensions of school quality are more efficient at eliciting individual change. Future research that incorporates more information on the costs of each aspect is necessary to make this type of programmatic recommendation.

These findings also have important implications for research on family formation in United States and Europe. In the U.S. adolescent sexual behavior and non-marital childbearing are of concern among academics and policy makers alike. The results of this dissertation indicate that additional research on attitudes may be particularly fruitful in understanding these social phenomena. Research into individuals' assessment of the costs and benefits of childbearing and contraceptive use and into how attitudes condition those assessments may be fruitful. Edin and Kefalas' recent work on non-marital childbearing is a prime example (Edin and Kefalas 2005).

Also, based on my findings regarding the effect of family planning curricula in schools on contraceptive use, we may want to investigate similar relationships in the United States. For instance, moving beyond a simple program effect of whether participation in a school based family planning program lowers sexual risk taking, researchers may want to investigate how the presence of such a program in schools and communities influences community members attitudes about childbearing and their

subsequent childbearing behavior. This type of research on exposure effects of aspects of social context on broader populations may be a crucial piece of our understanding of the full extent of program effects. However, before this work is undertaken clear theories on how exposure effects occur in settings with far more privacy, social isolation, mass media exposure and avenues, and transportation infrastructure than the setting used here are necessary.

The findings described above regarding the influence of both structural and ideational causes are also relevant for research on the causes of low fertility. Recent research in this area has focused on structural determinants (Esping-Anderson 1999; McDonald 2000; Morgan 2003; Rindfuss et al. 2003). To better understand these fertility patterns we should perhaps add studies of changing attitudes in these countries to the literature (Thornton 2005). Specifically researchers may want to investigate whether there are fewer social benefits to childbearing or whether the benefits of other opportunities such as work and education simply outweigh those of childbearing. Also, because low fertility is occurring in both rich and poor countries it may be important to understand how attitudes influence the assessment of the costs and benefits of childbearing given different structural characteristics.

In addition to data collection efforts focused on obtaining measures of attitudes over time, there are other steps researchers can take to build on the work presented in this dissertation. First, all of the analyses in this dissertation look only at women's own attitudes. However, the theoretical framework indicates that one's assessment of the costs and benefits of childbearing and contraceptive use are also influenced by others' attitudes. In this setting, husbands', parents', and neighbors' attitudes may be particularly

important and future research should incorporate them into behavioral models. Also, future research should investigate this complex relationship between context, attitudes, and individual behavior using different dimensions of social context and different individual behaviors. It may be that attitudes play a different role in different sets of relationships. Depending on the setting, other pieces of context such as employers or mass media venues may be particularly influential. Caring for the elderly, household structure and living situations, and child mortality are some other individual behaviors sociologists and demographers may be interested in examining in this manner.

APPENDIX A:

MODELS WITH ORDINAL MEASURE OF ATTITUDE ABOUT CHILDREN'S CONTRIBUTION TO THE HOUSEHOLD FROM CHAPTER 7.

Table A.1. Multilevel OLS Regression: Schools and Attitudes: Some people think that having many children would help parents do their work.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
School characteristics										
Has family planning curriculum	-0.07					-0.15*				
	(-1.26)					(-2)				
Proportion of teachers who are female		-0.53***					-0.4*			
		(-3.84)					(-2.2)			
Proportion of teachers with at least a college degreee			0.05					-0.33*		
			(0.41)					(-1.91)		
Proportion of students who are female				-0.08+					-0.13*	
				(-1.29)					(-2.21)	
Has fee for 1st grade					-0.3+					-0.06*
					(-1.44)					(-2.31)
Controls										
Individual experiences										
Went to school before age 13	0	-0.01	-0.01	-0.01	0	0	0	-0.01	0	0
	(-0.08)	(-0.18)	(-0.18)	(-0.1)	(-0.02)	(-0.05)	(-0.07)	(-0.12)	(-0.08)	(-0.07)
Index of non-family experiences before age 13	-0.06*	-0.05*	-0.06*	-0.06*	-0.06*	-0.06*	-0.06*	-0.06*	-0.06*	-0.06*
	(-1.96)	(-1.84)	(-2.05)	(-1.96)	(-2.01)	(-1.97)	(-1.98)	(-2.01)	(-1.99)	(-1.99)
Community characteristics (community lived in before age 12)										
Index of number of non-family organization in community	0	0	0	0	0	0	0	0	0	0
	(-0.05)	(0.08)	(-0.04)	(-0.03)	(0.04)	(-0.07)	(-0.05)	(-0.06)	(-0.07)	(-0.06)
Parental characteristics										
Father ever went to school	-0.12**	-0.11*	-0.12**	-0.12**	-0.12**	-0.12**	-0.12**	-0.12**	-0.12**	-0.11**
	(-2.39)	(-2.27)	(-2.41)	(-2.44)	(-2.41)	(-2.34)	(-2.34)	(-2.35)	(-2.33)	(-2.33)
Father ever worked for pay outside the family	0.05	0.06	0.05	0.05	0.05	0.06	0.06+	0.06	0.06+	0.06+
	(1.17)	(1.26)	(1.09)	(1.07)	(1.16)	(1.24)	(1.29)	(1.28)	(1.31)	(1.31)
Mother ever went to school	0.09	0.1	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
	(1.2)	(1.28)	(1.18)	(1.21)	(1.15)	(1.18)	(1.15)	(1.17)	(1.15)	(1.15)
Mother's children ever born	0	0	0	0	0	0	0	0	0	0
	(0.35)	(0.44)	(0.4)	(0.42)	(0.43)	(0.41)	(0.42)	(0.41)	(0.43)	(0.43)

(cont.)

Table A.1. Multilevel OLS Regression: Schools and Attitudes: Some people think that having many children would help parents do their work.

	School closest to respondent's current neighborhood when respondent age 13					Geoweighted average of neighborhood when respondent age 13				
	1	2	3	4	5	6	7	8	9	10
Parental characteristics continued										
Parents ever used contraceptives	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	(0.49)	(0.7)	(0.52)	(0.52)	(0.53)	(0.61)	(0.64)	(0.63)	(0.64)	(0.64)
Ethnicity[a]										
Low caste Hindu	0.15*	0.12+	0.14*	0.14*	0.15*	0.14*	0.13*	0.13*	0.13*	0.13*
	(1.95)	(1.58)	(1.82)	(1.86)	(1.92)	(1.82)	(1.77)	(1.78)	(1.75)	(1.74)
Newar	0.13+	0.15*	0.11+	0.12+	0.11+	0.12+	0.12+	0.11+	0.11+	0.12+
	(1.52)	(1.74)	(1.34)	(1.41)	(1.29)	(1.39)	(1.38)	(1.34)	(1.35)	(1.37)
Hill Tibeto-Burmese	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
	(0.47)	(0.4)	(0.47)	(0.5)	(0.36)	(0.37)	(0.33)	(0.36)	(0.32)	(0.32)
Terai Tibeto-Burmese	0.41***	0.41***	0.42***	0.42***	0.42***	0.41***	0.41***	0.41***	0.41***	0.41***
	(6.41)	(6.46)	(6.52)	(6.6)	(6.51)	(6.48)	(6.44)	(6.43)	(6.37)	(6.37)
Lived in this neighborhood before age 13	0.11*	0.11*	0.11*	0.11*	0.11*	0.11*	0.11*	0.11*	0.11*	0.11*
	(2.07)	(2.14)	(2.11)	(2.13)	(2.12)	(2.06)	(2.03)	(2.06)	(2.04)	(2.03)
Birth cohort[b]										
Born 1976-1972 (age 20-24 in 1996)	-0.28***	-0.29***	-0.28***	-0.29***	-0.29***	-0.28***	-0.29***	-0.29***	-0.28***	-0.28***
	(-4.62)	(-4.77)	(-4.66)	(-4.77)	(-4.8)	(-4.64)	(-4.73)	(-4.69)	(-4.67)	(-4.67)
Born 1971-1967 (age 25-29 in 1996)	-0.28***	-0.29***	-0.28***	-0.29***	-0.3***	-0.27***	-0.28***	-0.28***	-0.27***	-0.27***
	(-3.69)	(-3.89)	(-3.68)	(-3.85)	(-3.93)	(-3.62)	(-3.71)	(-3.72)	(-3.63)	(-3.62)
Born 1966-1952 (age 30-44 in 1996)	-0.26***	-0.24***	-0.25***	-0.27***	-0.31***	-0.24***	-0.24***	-0.25***	-0.24***	-0.24**
	(-3.33)	(-3.12)	(-3.18)	(-3.42)	(-3.55)	(-3.12)	(-3.13)	(-3.25)	(-3.13)	(-3.07)
ICC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	1226	1226	1226	1226	1226	1226	1226	1226	1226	1226

[a]Reference category is Upper caste Hindu.

[b]Reference group is born 1981-1977 (age 15-29 in 1996).

+ p <.10; * p <.05; ** p <.01; *** p <.001; one-tailed tests

Table A.2. Multilevel Hazard Model Estimates: Schools, Attitudes, and Contraceptive Use[a]

	1	2	3	4	5
Schools (geoweighted average of neighborhood when respondent age 13)					
Has family planning curriculum	1.31+ (1.53)				
Proportion of teachers who are female		2.02* (1.79)			
Proportion of teachers with at least a college degreee			1.91* (1.98)		
Proportion of students who are female				1.35** (2.41)	
Has fee for 1st grade					1.14* (2.32)
Attitudes					
A man should make most of the decisions in the household.	0.86* (-1.85)	0.87* (-1.81)	0.87* (-1.73)	0.87* (-1.77)	0.87* (-1.79)
Some people think that having many children would help parents do their work.	0.96 (-0.86)	0.96 (-0.85)	0.96 (-0.87)	0.96 (-0.85)	0.96 (-0.84)
It is better to have no children than to have a child who marries a spouse of a different caste.	0.87* (-1.78)	0.87* (-1.79)	0.87* (-1.77)	0.87* (-1.78)	0.87* (-1.78)
ICC	0.17	0.17	0.16	0.17	0.17
Person months	66422	66422	66422	66422	66422

[a]Includes all controls described in text.

+ P < .10, one tailed test; * P < .05, one tailed test; ** P < .01, one tailed test; *** P < .001, one tailed test

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