Social interactions and sexual behavior. Explaining HIV preventive practices in Southeastern Africa

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Abstract: Esta obra se presentó como tesis doctoral en la Facultad de Ciencias Políticas y Sociología de la Universidad Complutense de Madrid, el 21 de diciembre de 2011. El Tribunal estuvo compuesto por los profesores doctores Joaquín Arango Vila-Belda, Ignacio Sánchez-Cuenca, José Noguera, Montserrat Solsona y Maria Roura.

Most new HIV infections in sub-Saharan Africa, the region most devastated by the epidemic, take place in married or cohabiting serodiscordant couples. Men and women are likely to get infected by their spouses in contexts where the HIV prevalence rates are extremely high, the use of condoms is not generalized, and extramarital affairs are not a rare phenomenon. Understanding the factors that explain why married individuals adopt certain preventive/risky behaviors is crucial. This dissertation analyzes two practices: condom use within marriage and extramarital sex. It focuses on estimating the effect of social interactions, as a key mechanism through which people become aware of the social acceptability of such practices. Particularly, I examine the relevance of the social norm of fidelity. Perceptions of low compliance with the norm in the social network (empirical expectations, as conceptualized by Bicchieri) are expected to increase the likelihood of having extramarital sex, especially in dense networks, and reduce the conflict between condom use within marriage and the norm of fidelity. To suggest condom use to a regular partner is a signal of distrust, but that should not be so problematic in contexts in which the norm is weak and extramarital sex is accepted or tolerated. On the other hand, the incompatibility between condoms and fidelity might be solved if its use is socially interpreted as a contraceptive method instead of an HIV preventive practice. This dissertation analyzes information about rural populations of Malawi and Kenya that has been collected by the Malawi and Kenya Diffusion and Ideational Change Projects. Both cross-sectional and longitudinal analyses are applied to the data from these longitudinal surveys with the purpose of dealing with the selection problem of social networks. The study of condom use within marriage is based on a couple-level analysis, using Latent Class Analysis, while married individuals are the units of analysis in the rest of the empirical investigation.

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Centro de Estudios Avanzados en Ciencias Sociales

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ABSTRACT

Most new HIV infections in sub-Saharan Africa, the region most devastated by the epidemic, take place in married or cohabiting serodiscordant couples. Men and women are likely to get infected by their spouses in contexts where the HIV prevalence rates are extremely high, the use of condoms is not generalized, and extramarital affairs are not a rare phenomenon. Understanding the factors that explain why married individuals adopt certain preventive/risky behaviors is crucial. This dissertation analyzes two practices: condom use within marriage and extramarital sex. It focuses on estimating the effect of social interactions, as a key mechanism through which people become aware of the social acceptability of such practices. Particularly, I examine the relevance of the social norm of fidelity. Perceptions of low compliance with the norm in the social network (empirical expectations, as conceptualized by Bicchieri) are expected to increase the likelihood of having extramarital sex, especially in dense networks, and reduce the conflict between condom use within marriage and the norm of fidelity. To suggest condom use to a regular partner is a signal of distrust, but that should not be so problematic in contexts in which the norm is weak and extramarital sex is accepted or tolerated. On the other hand, the incompatibility between condoms and fidelity might be solved if its use is socially interpreted as a contraceptive method instead of an HIV preventive practice. This dissertation analyzes information about rural populations of Malawi and Kenya that has been collected by the Malawi and Kenya Diffusion and Ideational Change Projects. Both cross-sectional and longitudinal analyses are applied to the data from these longitudinal surveys with the purpose of dealing with the selection problem of social networks. The study of condom use within marriage is based on a couple-

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CHAPTER 1. THE HIV/AIDS EPIDEMIC IN SUB-SAHARAN AFRICA AND MARRIED INDIVIDUALS' PREVENTIVE / RISKY BEHAVIOR

1.1. Introduction

Recent studies about the HIV incidence rates in sub-Saharan Africa, the region most devastated by the epidemic, show that most new infections take place in married or cohabiting serodiscordant couples. This means that unprotected sex within marriage, even in monogamous unions, can no longer be considered 'low-risk behavior'. Men and women are likely to get infected by their spouses in contexts where the HIV prevalence rates are extremely high, the use of condoms is not generalized in any kind of sexual relation, and extramarital affairs are not a rare phenomenon. Thus, the importance of marital sex in the spread of the disease should make scientists aware of the need to understand married people's behavior in order to identify the best strategies for prevention programs. Fortunately, some important efforts are starting to be made in the scientific arena, and, hopefully, prevention programs targeted at couples will become more and more frequent.

Several different practices, such as the generalization of condom use outside marriage, the spread of male circumcision, and the reduction of sexual partners, could reduce the high incidence of HIV infections in marital unions. A large share of the

empirical studies about preventive behavior has focused on studying the use of condoms in general. The type of sexual relationship or simply the respondent's marital status have usually been included in models as control variables. However, as I try to clarify in this dissertation, the particular causal mechanisms that explain sexual behavior might not be the same in any kind of relationship. The factors that determine the action are likely to be different depending on the type of relationship, since social norms that regulate behavior are contingent on the context. Thus, condom use as a preventive practice must be analyzed separately for each kind of relationship.

This dissertation analyzes two preventive/risky sexual practices carried out by married individuals in rural areas of one sub-Saharan country, Malawi. Only one part of the study also focuses on rural Kenya, given the lack of available data. Such practices are condom use within marriage and having or not extramarital sexual partners. As regards the former, the study of this practice is particularly interesting because it is under-researched and because it gives rise to many prominent questions about the influence of social norms and the importance of the way in which the action, condom use in this case, is interpreted –as a preventive practice or, on the other hand, as a contraceptive method. In addition, understanding the difficulties in the spread of condom use within marriage may also shed some light on the research about preventive behavior in other types of long-term sexual relations (extramarital or premarital ones), which are partly regulated by similar social norms. Obviously, a scenario in which condom use within marriage is accepted and frequently used cannot solve the whole epidemic problem, but it may reduce the likelihood of infection, especially in couples who already have children. The other sexual behavior under study, extramarital sex, is clearly a relevant topic, since it constitutes the channel through which HIV is brought into the marital union.

Among all the factors that may have some influence on the likelihood of adopting any of these two behaviors, the dissertation pays special attention to the role of social interactions, as a key

mechanism through which people become aware of the social acceptability of the practices. The empirical analysis is intended to estimate the effect of certain characteristics of social networks on particular attitudes and behaviors. More specifically, my interest lies in researching the extent to which one's attitude and behavior is affected by how others behave, apart from the effect of how others think or say they think that a person ought to behave or, in other words, what is normatively considered right or wrong.

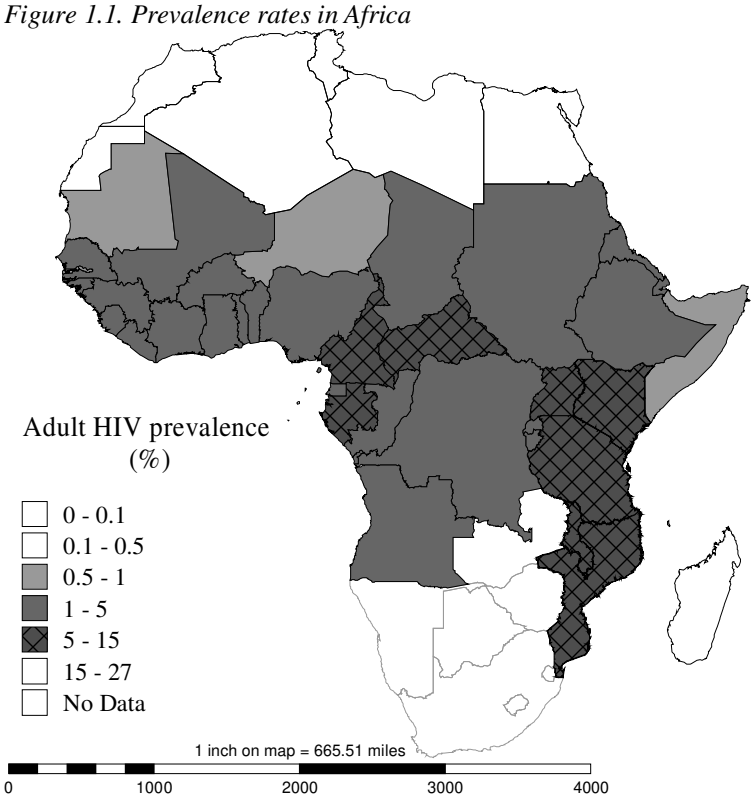
1.2. The HIV/AIDS epidemic

The HIV/AIDS epidemic is still a major public health problem in many countries. In 2008 the number of people living with HIV worldwide was estimated to be 33.4 million (UNAIDS and WHO, 2009). This means that the number is higher nowadays than ever before. The prevalence is around three times higher than in 1990. Such a continuing rise is the result of both the high levels of new HIV infections and the reduction in deaths caused by AIDS-related illnesses. The latter has been achieved thanks to the prominent and rapid expansion of access to antiretroviral treatment during the last decade in low- and middle-income countries. The coverage increased from 7% in 2003 to 42% in 2008 (UNAIDS and WHO, 2009). Important progress has also been made in preventing new HIV infections, but the numbers are still very high.

Sub-Saharan Africa is the region most affected by HIV and the transmission is predominantly heterosexual. In 2008, this region accounted for 72% of the world's AIDS-related deaths. As Figure 1.1 shows, countries in the east and, especially, the south of the continent are the ones that have the highest HIV-prevalence rates. The worst conditions are found in Swaziland, where 26% of the adult population is infected (UNAIDS, 2008). Nonetheless, there are wide variations not only among countries, but within countries. Kenya and Malawi, the two countries in southeastern Africa that this research focuses on, show very different prevalence levels

among subregions. In Kenya, the rates in the provinces range from 0% to 15%, and the minimum and maximum in Malawi regions are 6.5% and 17.6%, respectively (KDHS 2003; MDHS 2004)[1].

Figure 1.1. Prevalence rates in Africa



Sources: UNAIDS, 2008; UNAIDS and WHO, 2009.

Sub-Saharan Africa is also heavily affected by poverty. More than 40% of people in, for instance, Rwanda, Zambia,

[1] The abbreviations KDICP and MDICP stand for Kenya and Malawi Diffusion and Ideational Change Projects.

Mozambique, Niger and Mali live below the national poverty line (World Development Indicators, 2006-2010). Sub-Saharan countries rank very low in several population health indicators, such as the infant mortality rate, malnutrition prevalence, and the maternal mortality ratio (World Development Indicators, 2006-2010). Bad health conditions may have contributed to the spread of the HIV epidemic, since untreated sexually transmitted infections multiply the risk of HIV infection. But the harmful effect of the HIV epidemic on the health and socioeconomic conditions of the sub-Saharan population is much more evident. Life expectancy has been notably decreasing since the early nineties, so that countries such as Zambia, Zimbabwe or Lesotho have seen their life expectancies drop from 60 to 40 years old (World Development Indicators). Moreover, nearly 12 million children under 18 years old have lost one or both parents to HIV (UNAIDS, 2008).

Women in sub-Saharan Africa are more vulnerable to HIV than men. Around 60% of the people estimated to be infected are females. In Kenya, women between 20 to 24 years are 5.5 times more likely to be infected than men of the same age (National AIDS/STI Control Programme, 2009). Women seem to have a greater biological susceptibility to becoming infected, although the evidence is not conclusive for Africa (Nicolosi *et al.*, 1994; Quinn *et al.*, 2000; Glynn *et al.*, 2001b; Gray *et al.*, 2001; Quinn and Overbaugh, 2005). But other factors may also contribute to this disproportionate risk. Gender inequality, difficulties in access to education, and socioeconomic disadvantages are some of the issues that reduce women's capacity to prevent HIV infection (Quinn and Overbaugh, 2005). Poverty is related to precarious sexual health conditions and may induce women to engage in transactional sex, which puts them at a higher risk. Women's economic dependence on their partners usually prevents them from insisting on protected sex. Besides, the suggestion of condom use may result in sexual and physical violence (Muhwava, 2004; Versteeg and Murray, 2008; Achan *et al.*, 2009).

It should be noted, however, that the HIV epidemic within sub-Saharan Africa is not a disease of poverty. It affects all social strata, and there is not a clear association between HIV infection and economic conditions at the macro level. The evidence at the micro level is mixed (Gillespie *et al.*, 2007). In Kenya, Malawi, and some other countries HIV prevalence is higher among those in the wealthiest quintile than among those in the poorest one (Mishra *et al.*, 2007), whereas the relationship is less clear in West African countries.

The association between the level of education and HIV infection seems to be more evident. While most educated people in the region were especially affected at the beginning of the epidemic, the relationship has shifted in the last two decades. Education is increasingly associated with less risky behaviors (Gillespie *et al.*, 2007; Hargreaves *et al.*, 2008).

The reaction of sub-Saharan governments to the epidemic has usually been belated and insufficient (Caldwell *et al.*, 1992). Although there is some variation in the political response, numerous scientists have pointed out that AIDS has occupied a marginal place in governments' agendas in many countries (Lanegran and Hyden, 1993; Johnson, 2004). Even the important defender of Human Rights, Nelson Mandela, gave almost no political importance to the disease while he was in power (Parkhurst and Lush, 2004). In addition to the lack of urgency in the reaction and the lack of resources earmarked for prevention programs, some explicit responses against intervention have also been made. South African ex-President Thabo Mbeki was denounced for blocking the use of antiretroviral drugs because of their side effects (Schneider, 2002) and he also sent a letter to world leaders in which he doubted that HIV was the exclusive cause of AIDS (Fassin and Schneider, 2003). Even when this reaction could be framed in a context of justified suspicion of conspiracy against Africans, inherited from the Apartheid times, those kinds of statements contributed to spreading the idea that AIDS and its treatments were instruments for eliminating the black population.

The explanations that have been offered about the insufficient response by sub-Saharan African governments refer to politicians' incentives (Fredland, 1998), previous health infrastructure, and relations with donors and NGOs (Parkhurst and Lush, 2004). Also, John Caldwell highlights governments and church leaders' reluctance to recognize and discuss the "African sexual system" (Caldwell, 2000: 130). The author has claimed that the silence about the disease in the public and in the private arenas has had a harmful effect on individual and government action. The argument about the importance of open communication about HIV/AIDS has been commonly used to praise Ugandan President Yoweri Museveni's contribution to the open discussion of the problem, and his effort to disseminate the idea that any person, independently of her status, can get infected (Caldwell, 2000; Parkhurst and Lush, 2004). Uganda and Senegal are the countries in sub-Saharan Africa where a clear positive state response against the disease took place (Boone and Batsell, 2001). Moreover, Uganda is usually identified as the example of a successful fight against HIV in Africa. Uganda, which was one of the first countries to suffer the epidemic, has shown a 70% decline in the HIV prevalence rate since the early nineties (Stoneburner and Low-Beer, 2004).

1.3. Reasons for the disproportionate HIV prevalence in sub-Saharan Africa

The first HIV-prevention interventions were intended to diffuse information about HIV/AIDS, the transmission channels, and ways to avoid infection (Caldwell, 2000). Thanks to these efforts, almost every person in these countries has heard about AIDS and most people know that the risk of infection can be decreased by the use of condoms and the reduction of sexual partners, especially commercial-sex partners, as the Demographic and Health Surveys (DHS) show. It cannot be denied, of course, that some incorrect beliefs about the disease and the prevention

methods are quite common. However, most scientists agree that the high HIV-prevalence rates in the region are not due to a failure in the education efforts. The availability of condoms is also reasonable enough to reject the idea of identifying the lack of access as the main reason for unprotected sex (Watkins, 2004; Hendriksen *et al.*, 2007).

Thus, which are the crucial factors that explain the severe situation in sub-Saharan Africa? Some authors have tried to find the answer in cultural features, such as idiosyncratic interpretations of death and illness. Beliefs in predestination (Amuyunzu-Nyamongo *et al.*, 1999) and the power of witchcraft and divine punishment (Balogun, 2010) have been mentioned. These beliefs are supposed to be reinforced by the reluctance to discuss the disease openly. Caldwell (1999) has also highlighted the stoical attitude towards death, given the very limited chances of reaching old age in the African context and the long latency period from the moment in which the infection occurs until the appearance of AIDS symptoms. However, as mentioned above, life expectancy at birth was notably higher before the onset of the epidemic. Besides, many people know someone who has died from AIDS and may have observed how much physical and psychological suffering AIDS implies for the patient and his family.

A more convincing explanation about the influence of the HIV latency period on individual inaction is the difficulty in relating certain behavior with health effects that may appear as much as ten years later (Caldwell, 2000; Watkins, 2004). Anyway, such aspects would be problematic in any region of the world, especially for low educated people and at the beginning of the epidemic, so it does not explain the special situation regarding the epidemic in sub-Saharan Africa.

Male circumcision is one of the most relevant factors for explaining variations in HIV infections at the macro and the micro levels in Africa and Asia. According to several ecological studies, those geographical areas where male circumcision is a common practice show much lower HIV prevalence rates (Caldwell and

Caldwell, 1996; Wilson and de Beyer, 2006). The association is also observed in studies that analyze rates of sero-conversion of uncircumcised and circumcised males in different populations (Cameron *et al.*, 1989; Gray *et al.*, 2007). Recent randomized trials in South Africa and Kenya show such a notable impact of male circumcision on the reduction of HIV infections that the authors defend the promotion of this practice in prevention programs (Auvert *et al.*, 2005; Bailey *et al.*, 2007; Gray *et al.*, 2007). Some plausible explanations have been offered to understand the protective function of circumcision in biological terms. The subpreputial space has good conditions for the survival of pathogens and the inner foreskin is more vulnerable to HIV infection than the keratinized outer foreskin and glans (Patterson *et al.*, 2002; McCoombe and Short, 2006).

Male circumcision may explain the gap between southeast and west Africa, given that this practice is only common in the latter, where the HIV prevalence rates are much lower. However, it cannot provide an answer to the question about the huge differences between sub-Saharan Africa and other populations, such as the European one, where male circumcision is not a generalized practice and the HIV incidence is much lower. It makes more sense to look for explanatory factors in the characteristics of sexual behavior, since most HIV infections in sub-Saharan Africa are transmitted through heterosexual intercourse. Many authors have pointed out that people in the region, especially men, frequently have multiple sexual partners before and after marriage (Caldwell, 2000). Even if that is the case, it is not clear, however, that having multiple sexual partners is more common among sub-Saharan people than in the heterosexual population in western countries (Santelli, *et al.*, 1998; Wellings *et al.*, 2006). Besides, it is particularly unlikely that men in places such as Rio de Janeiro and Thailand have fewer partners (Carael, 1995).

A very promising explanation about the role of sexual behavior in the high HIV prevalence in sub-Saharan Africa was

initially suggested by Morris and Kretzschmar (1995; 1997).[2] The authors state that, even if the number of sexual partners is the same, the variation in the frequency of concurrent long-term sexual relationships makes the difference. They demonstrate that the spread of the HIV infection in sexual networks where individuals have two or more relationships during an overlapping time period is faster than in networks where the actors have the same number of partners but within sequential relationships. In addition to the effect of the network dynamics, the variation in the transmissibility of the virus explains the importance of concurrent relations. The infectivity or the capacity to transmit HIV during a sexual intercourse is much higher during the short period immediately after the person becomes infected (Pilcher *et al.*, 2004; Wawer *et al.*, 2005). A person that has concurrent sexual relationships and gets infected is more likely to have sexual intercourse with different partners during the three weeks that the infectivity is higher after the contagion and, therefore, to infect other people. Evidence about the validity of this theoretical model is not conclusive as yet, mainly because there is no agreement on the operational definitions of concurrency and the best methods for measuring its association with HIV infection (Lagarde *et al.*, 2001; Ferguson *et al.*, 2004; Mishra and Bignami-Van Assche, 2009). However, many empirical studies are at present dealing with the test of this hypothesis.

The study of extramarital sexual relations and polygyny is of great importance for explaining the spread of HIV, since they are related with the existence of both multiple sexual partners and concurrent relations. It is thus interesting to explore the role of the fidelity norm in sub-Saharan Africa.

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[2] A mathematical model that explained the relevance of concurrent partners in HIV transmission was published some years before (Watts and May, 1992), although no reference was made to the patterns of sexual behavior in sub-Saharan Africa.

1.3.1. Extramarital sex and polygyny in sub-Saharan Africa

Most marriages in sub-Saharan countries are monogamous, but the region has a long tradition of polygyny. The DHSs show that the share of marriages that are polygamous varies a lot between countries. According to men's reports, the percentage of men with more than one wife ranges from 3.8% in Rwanda to 36.7% in Guinea.[3] Caldwell (1963) and other authors have identified some consequences of the high levels of polygyny that are relevant for understanding sexual behavior. Such high levels imply, first, that husbands are much older than their wives and that the age at first marriage for most men is higher than in other places without polygyny (Philipson and Posner, 1995). The delay in the transition to marriage leads to an increase in premarital sex (Bongaarts, 2007), which increases the risk of HIV transmission between young single men and their current and future sexual partners. Secondly, the widespread idea in the population that men are biologically determined to need more than one sexual partner may have its roots in the polygyny tradition (Orubuloye *et al.*, 1997). Although the causes of polygyny have nothing to do with sexuality but with conditions of the marriage and economic markets (Barber, 2008), people may have interpreted that polygyny is the logical result of a natural need. All these features may have contributed to increasing the number of sexual partners, and therefore, the HIV prevalence in sub-Saharan countries, especially in areas where polygyny is more frequent. Moreover, polygyny also involves concurrent sexual relations, which is likely to facilitate the spread of the disease, as mentioned above.

An alternative argument contradicts the positive association between the number of wives per husband and HIV incidence. Some authors have argued that polygamous unions may trap the infection, since men would be less prone to have extramarital sex (Carael *et al.*, 2001; Mitsunaga *et al.*, 2005). However, the empirical evidence for this is mixed. In fact, some studies have

[3] See Rwanda DHS 2007 and Guinea DHS 2005.

found that men in polygamous marriages are more likely to have extramarital affairs (Reniers and Tfaily, 2008), but this result is far from being a common finding (Nnko *et al.*, 2004).

Long and frequent periods of postpartum abstinence, given the high levels of fertility, have been also highlighted as a relevant explanatory factor of male extramarital sexual behavior (Awusabo-Asare and Anarfi, 1997; Glynn *et al.*, 2001a).

Social definitions of masculinity may also influence men's sexual behavior. Several qualitative studies have observed that men in the region reinforce their masculine identity by showing signs of their good skills in the sexual domain, such as the number of sexual partners (Varga, 1997; Kaler, 2003; Smith, 2007). Even more, the number of partners informs about the economic resources of men, since sexual relations, not only commercial ones, are expected to involve some kind of economic exchange from the man to the woman (Smith, 2007). Men are supposed to offer some monetary or non-monetary transfers in informal relations (Luke, 2006; 2007; Tawfik and Watkins, 2007).

All these aspects may have contributed to making men's extramarital sex more frequent and acceptable. This characteristic plus women's traditional dependence on men for economic and social resources have put them at a high risk of HIV infection in their marital relations (Awusabo-Asare *et al.*, 1993). Being married does not protect women from HIV/AIDS. In fact, the largest share of new HIV infections are estimated to occur in serodiscordant married or cohabiting couples (Dunkle *et al.*, 2008). Heterosexual sex with a regular partner accounted for an estimated 44% of HIV infections in Kenya in 2006 (Gelmon *et al.*, 2009). Similar or higher proportions are observed in the populations of other countries, such as Uganda, Swaziland and Lesotho (Khobotlo *et al.*, 2009; Mngadi *et al.*, 2009; Wabwire-Mangen *et al.*, 2009). Married women are considerably more likely to be HIV-positive than single females of the same age (Glynn *et al.*, 2001b; Kelly *et al.*, 2003), in spite of the fact that the latter report more sexual partners than the former (Clark, 2004). In the case of married women, empirical evidence shows

that they are at higher HIV risk not because they practice "risky" sexual behavior, but because they are likely to get infected during unprotected sex with their husbands. Some studies that gather data on biomarkers for HIV conclude that a husband is twice as likely as a wife to be the first one who gets infected in the couple (Carpenter *et al.*, 1999; Lurie *et al.*, 2003).

Despite the relevance of marital sexual behavior for the spread of HIV in sub-Saharan countries, very few preventive programs are specifically targeted at couples (UNAIDS and WHO, 2009). Many questions about this issue are still unresolved in the scientific field as well. Perhaps the most relevant shortcoming is the lack of studies that analyze couples, instead of individuals. Empirical analyses that systematically take into consideration the characteristics of both partners are not so frequent, and there are only a few cases that take couples as units of analysis. For all these reasons, the main motivation of this dissertation is to contribute to the understanding of married people's HIV-preventive/risky behavior in some sub-Saharan countries. Its role in the spread of the HIV epidemic is crucial, according to numerous studies published in prestigious journals, so it is urgent that we examine the factors that facilitate or hinder the adoption of preventive practices by this sector of the population.

1.3.2. Fidelity and low levels of condom use

In spite of the existence of extramarital relationships, it cannot be said that sexual infidelity is normatively supported. Marriage is traditionally viewed as based on respect, faithfulness and protection (Chimbiri, 2007). Contradictory moralities are reflected in that most people try to hide their extramarital relationships not only from their spouses but from the rest of the community, because their own and his family's reputation would suffer from gossip about unfaithfulness (Smith, 2007). According to recent and old anthropological studies, the elderly usually think that extramarital sex is more practiced by present young couples than

by people of their generation. They tend to interpret this perception as a result of a crisis of moral values (Kaler, 2001). Adults, not only old people, deem that extramarital sex puts marriage stability at risk (Kaler, 2001). Suspicion of infidelity is usually mentioned as one of the main reasons for marriage dissolution. This makes even more sense when it is taken into account that modern marriages, with a nuclear household organization, are more and more frequent in sub-Saharan Africa (Smith, 2007). This means that the selection of the spouse is less dependent on kin interests and more on emotional criteria (Smith, 2006). Therefore, extramarital sex is less likely to be tolerated when marital unions are supposed to be based on love and trust. In times of AIDS, divorcing an unfaithful spouse is perceived as even more justified (Chimbiri, 2007; Reniers, 2008). Individuals, especially women, are aware of the health risk that an unfaithful husband may bring to their homes. In addition, the presence of very influential churches that publicly express disapproval of infidelity is helping to reduce the social acceptance of extramarital affairs (Chimbiri, 2006; Clark, 2010). It must be said, however, that women's adultery is much less tolerated than men's. A husband is supposed to never tolerate or forgive his wife's unfaithful behavior (Chimbiri, 2007).

The normative support of fidelity that has been mentioned is crucial for understanding the low levels of condom use in marital relations in sub-Saharan Africa, as in any other population. One of the main arguments defended in this dissertation is that condom use as an HIV preventive practice is incompatible with the social norm of fidelity between spouses. Suggesting condom use to the spouse is a sign of distrust, either because oneself should not be trusted or because the partner is not trustworthy. Such distrust is, then, in conflict with the norms that regulate marital unions (Tavory and Swidler, 2009). Empirical studies show that an individual's use of condoms heavily depends on the type of sexual partner (Westercamp *et al.*, 2010; de Walque and Kline, 2011). Protected sex is much more frequent in commercial and, to less

extent, in casual relations. Moreover, the likelihood of using condoms usually decreases with the duration of the relationship.

Unfortunately, the use of condoms in informal relations is more common but not generalized, and that is why people who have extramarital partners are likely to get infected outside marriage and bring HIV into it. Several qualitative studies have observed that sub-Saharan people may reject the use of condoms even in non-marital relations because of other reasons different from trust (Chimbiri, 2007; Tavory and Swidler, 2009). Men and women dislike condoms because they reduce the pleasure of the sexual contact. The most common metaphor for the sexual act in many southeastern African countries is that of "sweetness" (Bauni and Jarabi, 2000; Hunter, 2002; Dilger, 2003; Thomsen *et al.*, 2004). The term refers more specifically to the contact with sexual fluids, which is hindered by the use of condoms. Another reason why people in the region reject the use of condoms is the fear of the health risks that condoms are supposed to pose. Condoms are sometimes believed to lead to sores, cancer or other very dangerous illnesses. Even some stories about condoms being part of a Western or government plot to eliminate people proliferated in different countries, although such stories are less and less discussed among the population (Kaler, 2004; Tavory and Swidler, 2009). Thus, limitation of sexual pleasure and beliefs about bad health consequences help obstruct the generalization of condom use in any kind of sexual relations, such as extramarital affairs. And, as explained above, the use of condoms is less likely to occur, the longer the relations with non-marital sexual partners last.

Therefore, married individuals, even when faithful, face a high risk of getting HIV because their spouses might have other sexual partners with whom they do not use condoms.

1.4. The aim of the dissertation: examining the influence of social interactions on married people's behavior

One conclusion that can be derived from the enumeration of the reasons why the HIV prevalence rates are so high in Southeastern Africa is that the social environment is a crucial factor. Good knowledge of the disease and the perception of risk are not enough to make people adopt preventive practices. Protected sex and other preventive behaviors, such as the reduction of sexual partners by married individuals, have to be compatible with more general social norms that regulate marriage in order for them to occur and spread. It can be said, then, that the individual's behavior and attitude is expected to be strongly dependent on what is perceived as socially acceptable or tolerated. And it is at this point that one can imagine the important role that social interactions play in this matter. In populations where access to the mass media is very limited, interpersonal communication is even more relevant for becoming aware of the dominant opinions and behaviors in the community. In the search for the most effective strategies for convincing people to use new methods that improve their health conditions, many studies have found that individuals pay attention to what others think and do, especially in contexts of high uncertainty (Rogers, 1995). In times of notable social, political or environmental change, people are uncertain about the proper ways to face the new situation. The introduction of modern contraceptive methods in Africa and the HIV/AIDS epidemic are two good examples. In fact, many studies have dealt with the importance of social interactions and peer influence on the diffusion of modern contraception and, to a lesser extent, condom use and positive attitudes towards HIV prevention (Montgomery and Casterline, 1996; Kohler *et al.*, 2001).

It has been observed that men and women informally talk with others about topics such as family planning, AIDS and sexual behavior. As Susan Watkins affirms (2004), surveys and some qualitative techniques have enabled scientists to observe that there is little silence about or denial of the disease in the private arena,

contrary to what much of the literature on the AIDS epidemic in sub-Saharan Africa has defended –Caldwell being a relevant exponent of this position. Even when the political elites have not openly discussed these questions, individuals have shared their concerns, anxieties, knowledge and doubts with the people around them.

The existence of interpersonal communication gives rise to many questions about the influence on people's attitudes and behavior of such information exchange, not only in terms of the content but also as regards the characteristics of the process. Some of these questions have already been posed and examined in certain contexts. Concerning AIDS in sub-Saharan Africa, the extent to which social network partners perceive themselves at risk of contracting the disease has a significant effect on the individual's perception of risk and attitude towards discussing AIDS with the spouse in Malawi and Kenya (Helleringer and Kohler, 2005; Smith and Watkins; 2005; Kohler *et al.*, 2007). Also, predominant opinions in the network influence personal attitudes towards preventive practices such as condom use or fidelity (Bühler and Kohler, 2003). In addition, numerous studies have highlighted the relevance of peer pressure in the adoption of risky sexual behavior (Nzioka, 2001; Munthali *et al.*, 2004; Selikow *et al.*, 2009) and the effectiveness of prevention programs based on peer education (Leonard *et al.*, 2000; Campbell and MacPhail, 2002; Sloan and Myers, 2005).

In sum, most quantitative studies about the role of social networks on HIV/AIDS issues have focused on explaining individual attitudes and perceptions. Dependent variables that measure sexual behaviors have been less explored. Smith and Watkins (2005) explain this niche in the literature by arguing that people are likely to misreport intimate behavior. However, the problem of biases in respondents' reports might affect the study of attitudes and opinions as well. The researchers' task is thus to come up with the best ways to extract reliable information from the imperfect data and improve the estimation.

Given the relevance of married individuals' behavior for the HIV/AIDS diffusion process in sub-Saharan Africa and, on the other hand, the existence of unexplored questions in the research on social interactions, the main objective of the dissertation is to analyze the impact of social networks on married men and women's preventive/risky sexual behavior. Specifically, I am interested in analyzing the influence that social network partners' attitude and behavior have on men's extramarital sexual behavior and the use of condoms by married couples in two countries of Southeastern Africa: Malawi and Kenya. As explained in the previous subsections, both practices are very important for understanding the spread of the disease in the region and identifying the best strategies for improving the effectiveness of prevention programs.

In addition to the substantive aims of the dissertation, potential bias in the responses about controversial topics has motivated me to seek out methods that enable me to deal with misreporting. Thus, the other central purpose of the research is to shed light on the debate about the methodological strategies for obtaining good estimations even when the individuals that are under study are unlikely to openly reveal information about themselves.

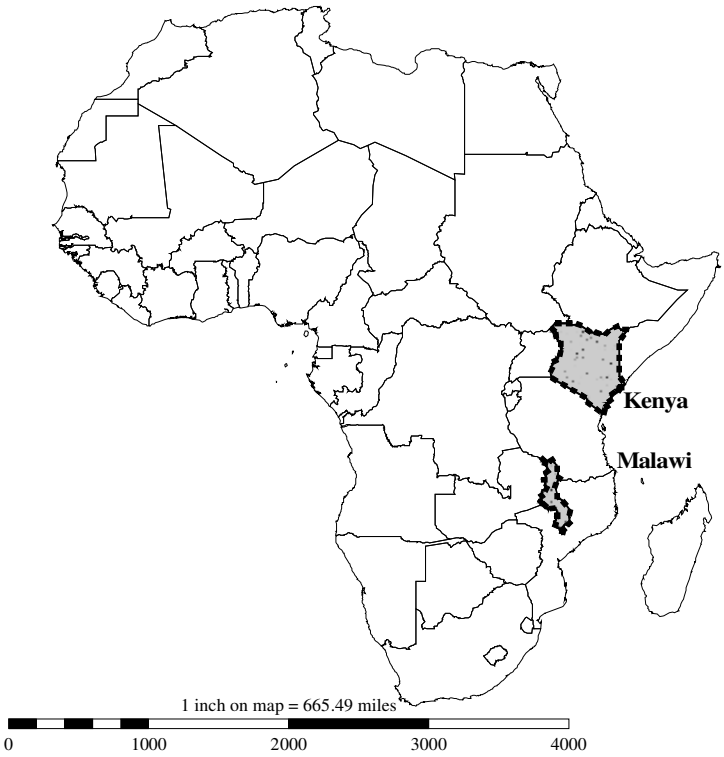
1.5. The selection of cases

Rural populations of Malawi and Kenya have been selected to be analyzed in this dissertation. One of the reasons for choosing these countries (Figure 1.2) is the availability of suitable data given the aims of the research. *The Malawi Diffusion and Ideational Change Project* and *the Kenya Diffusion and Ideational Change Project* provide information about both informal communication networks on AIDS and preventive/risky sexual behavior.[4] Unfortunately, databases that enable us to estimate the

[4] The characteristics of the datasets will be thoroughly described in the chapter about data and methods.

relation between interpersonal communication and behavior are not available for other countries in sub-Saharan Africa. Therefore, the conclusions from the empirical analyses of the dissertation are not intended to be generalized for the whole region.

Figure 1.2. Location of Kenya and Malawi



However, I expect that the mechanisms through which preventive behavior is affected by the social environment should be similar in any other country in southeastern Africa. The theoretical explanation about the influence of social norms on

individual actions through social interactions could be applied to different contexts. Moreover, Malawi and Kenya can be considered typical countries of the region in development, social and epidemiological terms, which makes the study of these countries relevant for understanding the spread of the disease over this part of the world. The HIV/AIDS epidemic is not concentrated in high-risk groups but generalized among the population. The most recent estimates of HIV prevalence rates among the adult population offered by the Demographic and Health Surveys are 12% and 6% in Malawi and Kenya respectively. In both countries, the common pattern in southeastern Africa of higher levels of HIV prevalence in urban areas and among women is observed (National Statistical Office Malawi and ORC Macro, 2005; Kenya National Bureau of Statistics and ICF Macro, 2010).

Extramarital sexual partners are also quite frequent in both countries, although the percentage of married men who report to have had other partners in the last year is lower than in other places such as Tanzania, Uganda and Zambia (Mishra and Begnami-Van Assche, 2009). Nonetheless, according to the datasets used in the empirical analysis in this dissertation, 15% of married women and 24% of married men in rural Malawi report that their best married friend (female or male respectively) had extramarital sexual partners in the previous year (MDICP 2004). Similar figures are observed in Kenya (KDICP 1999). Nevertheless, infidelity is not normatively supported in these populations or in the rest of the region either. Around 80% of married men in rural Kenya report that it is acceptable for a wife to divorce an unfaithful husband (KDICP 1999), and only 7% of married men in rural Malawi agree that it is acceptable for a married man to have sexual relations outside marriage (MDICP 2004).

Regarding the development conditions, Table 1.1 shows that Malawi and Kenya are similar to the average country in sub-Saharan Africa. In economic terms, the disparity is higher, since Malawi has a GDP per capita (in current US$) that is less than half the Kenyan indicator, which, in turn, is 32% percent of the

analogous figure for the average country in the region (World Development Indicators, 2008).

Table 1.1. Development conditions

	Malawi	**Kenya**	**Sub-Saharan Africa**
Gross Primary Enrollment (%)	120	112	98
Life Expectancy at Birth (years)	53	54	52
Infant Mortality (per 1,000 live births)	65	81	89
Urban Population (%)	17	21	36
GDP per capita (current US$)	288	783	2404

Note: Gross Primary Enrollment measures the percentage of the school-age population enrolled in primary.
Source: World Development Indicators, 2008.

The empirical analysis in the dissertation focuses on rural populations in Malawi and Kenya, as shall be explained in the Data chapter. For now, it should be noted that, although the analyzed survey samples are not representative of the whole rural population in each country, the responses to several questions are quite similar to those reported for analogous questions by rural individuals in the Demographic and Health Surveys –well-known nationally representative surveys. In the rural context of both countries, the economy is mainly based on subsistence agriculture. Although most people attend school, very few reach secondary or higher levels. Cash is obtained from wage labor, remittances or small-scale retailing (Kohler *et al.*, 2001; Kohler *et al.*, 2007). There is some heterogeneity in market activity and proximity to major transport routes between sub-regions and sites of the two countries. Moreover, the marriage system varies in the analyzed population. The Kenyan site and one of the three sites studied in

Malawi are characterized by a patrilineal/patrilocal system. Sons or male relatives inherit property and the marriage process usually involves the payment of a bride price. The husband and his kin control the resources and the offspring. In addition, residence is patrilocal. Polygynous marriages are more frequent in this system, where levirate rules that prescribe men to *inherit* their brother's widow can be found. In another Malawian site, the marriage system is matrilineal/matrilocal. In this case, inheritance is matrilineal through the wife's maternal uncle, who owns and controls the resources and the properties, and the husband usually moves into the wife's household or village. In the third of the Malawian sites, both systems are observed.

The type of marriage system is expected to have some impact on both the individual's social interactions and the power balance between spouses. Social network dynamics are likely to be affected by the type of residence system, since one of the two spouses is forced to leave the place where his/her family of origin and friends live. The type of ties between each spouse and his/her network partners, as well as the opportunities for expanding their social networks may heavily depend on the residence patterns. At the same time, matrilineal and patrilineal systems differ in wives' autonomy from their husbands. For instance, women's capacity for divorcing an unfaithful husband is clearly shaped by the resulting distribution of resources and household composition. Divorce does not seem to be a plausible option for women in a patrilineal system, since they have to leave their home and their children.

For all these reasons, the selection of rural populations with different marriage patterns enriches the study of HIV-preventive behavior and the influence social interactions have on it.

1.6. The methodological approach

A quantitative approach is used in the empirical analysis of the dissertation. The information provided by two longitudinal

surveys, one in each country, is analyzed with suitable statistical techniques. Some qualitative studies that explore processes of interpersonal communication about issues related with AIDS in sub-Saharan contexts have already been carried out (Agadjanian, 2002; Kaler, 2004). Such research suggests many research questions about influential mechanisms. The advantage of performing a longitudinal analysis of survey data is that an estimation of the causal effect with an associated confidence interval can be provided. The use of techniques such as panel analysis with fixed effects, which shall be explained in detail in Chapter 3, are especially appropriate in the study of the role of social interactions. This is so because the researcher interested in this topic needs to take into account that interlocutors or social network partners are not randomly distributed among the population. On the contrary, each person tends to select them according to different criteria. One of the most frequent selection processes, particularly in friendship relations, is that in which a person looks for people with whom she shares common characteristics, tastes or interests. The process thus results in what is called homophily. The systematic selection makes the estimation of the influence that the interpersonal interaction has on individual behavior more complicated, since we can confuse that effect with the individual's tendency to select particular network partners and, simultaneously, behave in a certain way. For instance, a man who is more willing to have extramarital partners is also more likely to have friends that do not dislike such behavior and with whom he can chat about these activities. If this matter is not taken into account, we can too easily conclude that having such friends is what really induces men to have extramarital sex, without taking into consideration the relevance of his original propensity. The panel analysis with fixed effects enables us to deal with the initial heterogeneity in the population, even when the characteristics are unobserved.

In addition to the difficulties derived from the potential selection problem, the study of sexual behavior faces respondents' reluctance to share details about their privacy. The reliability of

the reports might be too poor to make good estimations. On this matter, certain qualitative techniques offer more leeway to extract delicate information, since a more conducive environment is created. But tackling this limitation through a quantitative approach is clearly challenging. For that reason, one of the most stimulating tasks that I have decided to perform in this dissertation is to use the appropriate statistical technique for extracting reliable information and even identifying the characteristics that increase the likelihood that a person under- or over-reports a particular behavior. There is no need to insist on the potential benefits that this contribution involves for the research on many other controversial topics, beyond sexual behavior. The method applied, Latent Class Analysis, uses two sources of information about a specific event in order to estimate the 'true' behavior. Specifically both the husband and the wife's reports about condom use by the couple are taken into consideration. Thus, an analogous analysis could be directly applied to the study of many different questions related to couple's behavior, such as the distribution of housework, childcare or other decision making processes.

In sum, the methods used in the empirical analysis have been chosen to fulfill two main purposes: estimating the causal effects of social interactions on personal attitudes and behavior and dealing with the problem of data reliability resulting from the sensitive nature of the topic.

1.7. Structure of the dissertation

This research study is divided into seven chapters. In this chapter (Chapter 1), an introduction of the dissertation is presented –namely, the main objective of the research is set out, the characteristics of the context and the relevance of the research are clarified, and the basic features of the empirical approach are described. Chapter 2 discusses in theoretical terms the mechanisms through which social norms operate and the role that social interactions play in that process. Moreover, different

research questions derived from the implications of the theoretical arguments in the context of the HIV epidemic in sub-Saharan Africa are considered, and the specific issues that will be empirically analyzed in the dissertation are identified. Chapter 3 describes the datasets used in the analysis and addresses two methodological questions. First of all, the procedure for constructing measures of social networks with the available data is introduced. And secondly, the two most salient methodological challenges of this research study are identified. In addition, the statistical techniques that have been selected to deal with them are explained in detail. Chapters 4, 5 and 6 show the specific empirical questions and the results of the analyses. A presentation of the theoretical arguments that support the specific hypotheses is included in each of them, together with a description of the variables in the models. As mentioned above, one of the main concerns in the dissertation is the relevance of the fidelity norm for the adoption of certain preventive/risk behaviors. Thus, Chapter 4 analyzes the most intuitive effect of this norm through social interactions on individuals' actions –the influence on extramarital behavior. Another expected effect of this norm is that exerted on the likelihood of using condoms within marriage. But before addressing the explanation of this behavior, Chapter 5 examines the influence of the social network on married people's attitude towards this practice. Next, Chapter 6 explores the impact of social interactions on married couples' likelihood of using condoms in their relations. Finally, Chapter 7 summarizes the results and discusses the contribution of the dissertation to the better understanding of social norms and the factors that discourage or persuade married people from adopting HIV-preventive behaviors in southeastern Africa.

CHAPTER 2. THE ROLE OF SOCIAL INTERACTIONS ON INDIVIDUAL PREVENTIVE BEHAVIOR. A THEORETICAL APPROACH

Preventive/risky sexual behavior cannot be exclusively explained by individual risk perception and knowledge about HIV/AIDS and the ways to avoid infection. As shown in Chapter 1, the characteristics of the social environment matter. Information on others' behavior and opinions related to certain sexual practices, as well as on more general issues such as sexual infidelity and family planning, is relevant for individuals when taking decisions about their own behavior. Interpersonal interactions represent one of the main channels for receiving such information. People's knowledge about behavioral choices and the social acceptability of each of them is based on the information exchanged in social interactions, especially in contexts where the access to mass media and other impersonal sources is very limited.

The social acceptability issue raises questions about social norms and the mechanisms through which they influence behavior. In the following section, I present a review of the literature on social norms, but with a strong emphasis on Bicchieri's theoretical approach. This author has made a valuable contribution to the study of social norms, since she has offered an operational definition that distinguishes them from other behavioral guides and an exhaustive examination of the mechanisms of influence.

2.1. What do we know about social norms?

Social norms are the main basis of cooperation in human societies. Even legal norms are supported by a wide consensus about the normative legitimacy of the rules. However, the relevance that different disciplines have attributed to social norms varies very much. Culturalist perspectives in sociology have strongly defended that behavior mostly depends on social norms, cultural values, and shared meaning structures (Goffman, 1963; Geertz, 1973; Elias, 1982; Alexander, 2003). Many ethnographic studies describe a great variety of social norms in different societies (Willis, 1977; Anderson, 2000). On the other hand, social norms have barely deserved attention in economics until very recently. The traditional economic view assumes that individual behavior is the consequence of a conscious evaluation of costs and benefits associated with each action, given a personal order of preferences. Payoffs mainly refer to monetary gains or losses. Fortunately, an increasing number of researchers have started to recognize the importance of social norms, which are usually incorporated into their models as psychological costs or benefits (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). These recent contributions are particularly important in the research about social norms because they are an attempt to solve the most problematic feature of the culturalist perspectives: the lack of operational definitions that enable us to measure the effect of social norms (Hechter and Opp, 2001).

Economists' interest in social norms is probably motivated by the difficulties that traditional models face when attempting to solve public goods problems. The defining characteristic of a public good is that nobody (in the group) can be excluded from the consumption of the good. The existence of a public good implies that every person has the incentive to free ride, because she would be better off if she did not contribute to the production of the good, but did use it. Social norms may help to explain why it is not rare that people participate in collective actions even when the economic benefits they receive are lower than the costs.

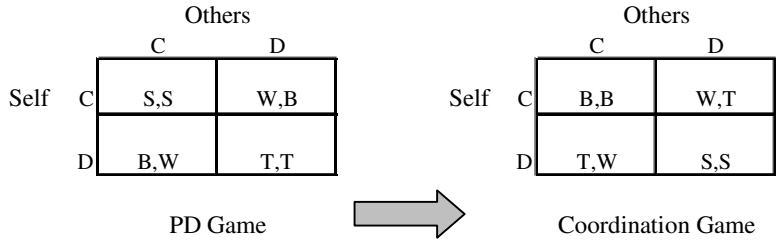
Bicchieri (2006) has developed a theory of social norms that has its roots in different contributions to sociology, economics, and cognitive psychology. The approach recognizes the relevance of social norms for human life and provides an operational definition in terms of preferences and expectations. In line with several theoretical accounts of cooperation in economics (Bowles and Gintis, 1998; Gintis *et al.*, 2005), the author makes use of game theory to model some features of social norms, and describes social norms as equilibria in particular types of games. However, Bicchieri points out that game theory and, in more general terms, rational choice theory do not offer enough tools to explain the emergence of social norms, so she also resorts to cognitive psychology in order to understand the process through which individuals come to recognize and project behavioral rules.

2.1.1. Conditional preferences and expectations

Bicchieri's (2006) definition of a social norm enables us to understand the link between causal mechanisms at the individual level and results at the macro level. The author states that a social norm exists as a behavioral rule for a particular situation when every person in a sufficient subset of the population knows that the rule applies to such a situation and prefers to abide by it on the condition that she believes that a relevant share of the population conforms to the rule (*empirical expectations*), and that a sufficient number of others think one ought to behave in that way (*normative expectations*). The number of others that is considered a sufficient subset of the population for norm compliance varies between and within individuals. Different individuals have different thresholds and one person may have different thresholds for different norms. Some people may need that most of the population conforms to the norm and think that that is the acceptable way of behaving, while some others may abide by the rule when they believe that, for instance, at least half of the group fulfils the conditions.

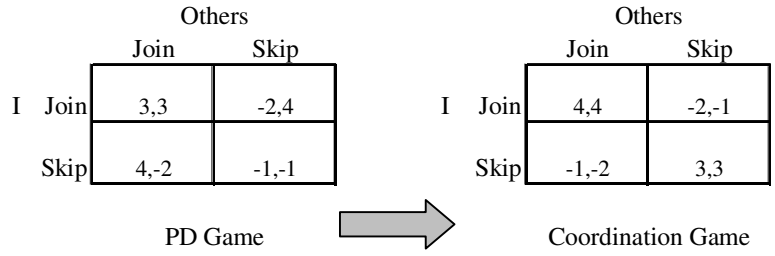
Thus, conditional preferences constitute one of the fundamental elements in the definition. Individuals are assumed to prefer to conform to the norm if the norm exists (if the conditions are met). As is commonly argued, Bicchieri agrees that social norms often go against narrow self-interest, so she tries to explain why, in spite of that, individuals conform to the norm. According to her explanation, the existence of a social norm transforms the game (at least for norm followers) that players face into a coordination one. The preference ranking in which all the possible actions in the game are ordered shifts because actors prefer to obey the norm. Figure 2.1 is taken from Bicchieri's book (2006). The table on the left refers to a traditional Prisoner's Dilemma game, in which each player's ranking is DC>CC>DD>CD. B stands for 'best', S for 'second best', T for 'third best', and W for 'worst'. The original game transforms into a coordination game for the norm followers, so their new ranking is CC>DD>DC>CD. Preferences change because the conditions for compliance (expectations) are met. A social norm is, then, an equilibrium in a coordination game. If the conditions that support the existence of the social norm stop being met, then an individual will not conform to the norm. In other words, if the empirical and normative expectations do not reach the personal thresholds, the actor is not playing a coordination game anymore, and she will choose the strategy that is rational for satisfying her self-interest in the original game.

Figure 2.1. Norms transform games. In Bicchieri (2006)



The following example may help to illustrate Bicchieri's argument. I am about to pay my shopping in the supermarket, so I must take a decision: I could wait my turn and join the line or I could just skip it. In the absence of a social norm (the table on the left side in Figure 2.2), I would be better off if I skipped the line and avoided waiting. The others are also self-interested actors that care only about maximizing their payoffs. So, they prefer to skip the line as well. The result is chaos whereby everyone is fighting to be the first in line. However, none of us has incentives to adopt a different behavior, since an individual actor will be worse off if she stands in the line and the others skip it. Thus, the result is a Pareto sub-optimal equilibrium, since each of us would meet with more success if we all cooperated. However, everything changes when a social norm regulates this situation, that is to say, when the others and I expect that a sufficient subset of the society will join the line in similar contexts and think that this is the way in which one ought to behave. In that case, we all, as individual actors, prefer to act according to what others expect us to do. There are two Nash equilibria in this new game (the table on the right side in Figure 2.2), one of which is Pareto superior to the other. As I explain below, not only the feeling of embarrassment but also the recognition of people's expectations of what is reasonable and fair change our order of preferences. In fact, this norm could be understood as a specific behavioral guide derived from a more general social norm of fairness.

Figure 2.2. The social norm of lining up transforms the game



The reasons why individuals prefer to conform to the norm may vary. Many authors have argued that social norms are enforced when violations to the norm are expected to be punished (Fehr and Fischbacher, 2004; Elster, 2007). Social sanctions are necessary for cooperation because they imply that it is in the self-interest of individuals to comply with norms, since the costs of violation are too high (Parsons, 1951). The emphasis on the role of social sanctions gives rise to the question about who punishes the violator and why. Some authors have researched into this matter by carrying out experiments. Very interesting findings are those that show that not only the person whose payoff is reduced by the norm violation punishes, but even third parties that are not affected by the non-fulfillment decide to sanction the behavior do so. Fehr and Fischbacher (2004) argue that the fact that third parties punish even when this action is costly reveals the normative character of behavior, which, in turn, is based, according to the authors, on emotional reactions. Subjects may punish, for instance, because they feel angry with the unfair action. This does not mean that they will punish in any case, independently of the negative consequences that the sanction may have. In fact, both the economic and non-monetary benefits and costs of the punishment are assumed to be taken into account by the individual when evaluating the expected utility of the action.

Elster (1989) has been long defending the fundamental place of emotions in the operation of norms. According to his theoretical approach, the compliance with a social norm can be explained by the emotional reactions in both the norm violator and the observer. The author has stated that "[…] the emotive aspect of norms is a more fundamental feature than the more frequently cited cognitive aspects. If norms can coordinate expectations, it is only because the violation of norms is known to trigger strong negative emotions, in the violator himself and in other people" (Elster, 1989: 99-100). Bicchieri, however, offers an explanation of the operation of norms that is based on a cognitive process. As I will further explain in the following subsection, she states that no sharp distinction can be made between affect and cognition. She

mentions the impossibility of knowing the kind of motives by observing the areas of the brain that are activated when norm-related behavior takes place, since each area is usually involved in many tasks (Bicchieri, 2010). In addition, the author argues that emotions might be the result of the entrenchment of social norms in a society and in each of its members. As such, the reasons for norm compliance that Bicchieri identifies are not only related to the emotions derived from sanction. Although she recognizes the relevance of the fear of punishment and the desire to please others' expectations, Bicchieri also mentions the acceptance of others' expectations as legitimate. The latter might frequently go together with the recognition that sanctions against violators are legitimate, but this does not imply that conformity to the norms requires the existence of sanctions. Fear and the desire to please are relevant motives in small groups, where monitoring is possible and emotional links connect people. However, they become less powerful in big groups, where anonymity is more or less guaranteed, and the acceptance of others' expectations as well founded plays a central role in motivating norm compliance. Nevertheless, Bicchieri considers that there is no need to assume homogeneity in the motives for norm conformity among individuals, and recognizes that some people only decide to abide by the norm when they are threatened with sanctions.

In sum, Bicchieri offers an explanation of compliance with social norms that recognizes variation in both motives and conditions that need to be perceived by individuals for conforming to the norm.

In line with the purpose of offering an operational definition of social norms, Bicchieri specifies the characteristics that make social norms different from other types of norms. The author makes a special effort to define a clear and simple criterion for distinguishing different phenomena. The typology that she suggests is influenced by the distinction between *descriptive* and *injuctive* norms that Cialdini *et al.* (1991) had proposed before. Bicchieri defines descriptive, social and moral norms in terms of the basic elements: conditional or non-conditional preferences and

expectations. A descriptive norm exists when individuals prefer to conform to the rule if their empirical expectations are met, that is to say, when a sufficient share of the population conforms to the rule. Preferences for complying with a descriptive norm, however, do not depend on normative expectations, contrary to what happens with social norms. Individuals conform to descriptive norms because it is in their self-interest to behave in such a way. As explained above, social norms, in turn, often go counter for selfish reasons. Conventions, such as driving on the right side, are one type of descriptive norm. Everyone is better off conforming to the norm, although no intrinsic value is attributed to the convention –driving on the right is not intrinsically better than driving on the left. Other authors, such as Elster (2007), have also emphasized the arbitrariness of conventions. A descriptive norm is an equilibrium of an original coordination game. But what makes conventions different from the rest of descriptive norms is the requirement that they must always be a strict Nash equilibrium. This means that all players in the game prefer to coordinate. Some descriptive norms, on the other hand, exist even when only one side of the game is interested in coordinating. This is the case of imitation –a fashion might be based on some people's intention of imitating a particular group that receives no benefit from imitation.

The distinction between social and moral norms is more controversial. The difference lies in the unconditional character of moral norms, according to Bicchieri. An individual might obey a moral norm independently of others' opinions and behaviors. Preferences do not need to be conditional on empirical or normative expectations, although an extreme situation where nobody or almost no one behaves in that way might induce an individual to change her preferences. Nevertheless, Elster (2007) highlights the role of sanctions in order to differentiate between these two types of norms. The main motive for compliance with a social norm is the norm violator's fear of social sanctions and her interest in avoiding the negative emotions that the transgression would generate in herself and in others. On the other hand, moral

norms are obeyed even in the absence of monitoring, when nobody can observe the norm violation. As I have tried to clarify before, Bichieri does not agree with Elster's argument that emotions are the main determinant of conformity to social norms.

Other attempts to offer a typology of norms that can be found in recent literature are less systematic and more confusing. A vaguer distinction is offered by Hechter (2008). They argue that some norms lead us to behave in a way that is consistent with our self-interest, while others, *obligatory norms*, are contrary to it and must be enforced. Hechter affirms that sanctions explain the enforcement of obligatory norms. Therefore, obligatory norms would be analogous to the social norms in Bicchieri's work, although the definition is more blurred. Hechter (2008) adds that some other norms do not need to be enforced by others since they have been internalized. Once again, the author refers to the role that emotions, such as feelings of shame or embarrassment, play in the self-enforcement of norms. In line with Elster's definitions, the distinction between moral and social norms is based on the relevance of sanctions and emotions.

As regards the testable implications of Bicchieri's contribution, it should be noted that a definition of social norms based on individuals' beliefs about what others do and think ought to be done implies that different behavioral outcomes should be observed when expectations are modified once the information that individuals receive about others changes. Laboratory experiments have been the favorite methodological strategy for assessing this theoretical approach to social norms. In fact, Bicchieri and her colleges' empirical work is strongly influenced by the experimental literature in social psychology and economics. More specifically, the experiments about littering that Cialdini *et al.* (1991) had made some years before have been a key reference work for them. Most of the experimental research that Bicchieri and her colleges have elaborated deals with exploring the norms of fairness and reciprocity (Bicchieri, 2008; Bicchieri and Xiao, 2009; Bicchieri and Chavez, 2010). Several economists have also studied the operation of such norms and the relevance of

sanctioning through the use of experiments (Fehr and Gächter, 2000; Fischbacher *et al.*, 2001; Gintis *et al.*, 2003).

One of the most difficult tasks in the research about norms is to explain the process though which they emerge. As I have mentioned before, norms can be defined as equilibria in coordination games. However, it needs to be explained why one equilibrium is reached in the game instead of other possible equilibria. Bicchieri argues that the selection of one equilibrium depends on individuals' expectations. Thus, the question is: how are these expectations formed? And before answering that: how can people recognize that a norm exists and applies to a certain situation?

2.1.2. Deliberational vs. heuristic route to behavior

It has been a hard task in game theory to find the answer to the question *which equilibrium is played?*. Perhaps focal points are the most influential explanation that has been offered (Schelling, 1980). Schelling showed that individuals are sometimes able to coordinate by relying on shared perceptions that certain ways of coordinating are salient. Focal points make sense when we assume that it is common knowledge that certain strategies are predominant. Historical precedents provide actors with shared expectations of what others expect is expected to be done. Nevertheless, Bicchieri tries to offer an explanation that avoids the assumption of common knowledge and details the mechanisms through which individuals recognize that a norm exists.

Although Bicchieri's explanation of social norms is coherent with rational choice theory, since actions are predicted to be consistent with personal preferences and expectations, it does not fit with the traditional view of individuals as actors that consciously evaluate the costs and benefits that each option involves and choose the one that yields the highest expected utility. Bicchieri highlights that such an assumption is an unrealistic way of interpreting the decision process that leads us to

many different actions in our daily lives. The amount of time, effort and resources that are needed to take a deliberated and rational decision for every action is huge. In cognitive social psychology, there is wide agreement that those theoretical models that distinguish between two types of cognitive routes to behavior better explain our actions. Dual-process approaches defend that human beings are able to use two modes of information processing (Fazio, 1990; Chaiken and Trope, 1999). One of the modes is the conscious and systematic evaluation of the utility that each behavioral option brings, given the available information for the individual and her preferences. This mode is likely to be used when the action has very important consequences in emotional or material terms, which makes the person especially motivated. However, if the repercussion is not supposed to be so relevant, a rapid and automatic mode of information processing is preferable. The action is unconsciously triggered by a behavioral rule that prescribes a particular course of action for the situation, instead of being the result of a calculus of the consequences of actions and the probabilities of occurrence. The heuristic route to behavior involves that individuals search for cues when they are faced with a new situation in order to interpret it. A process of categorization through cognitive shortcuts allows us to associate such a context with similar ones that she has already experienced, and leads to the activation of a particular script. The more ambiguous a situation is, the more likely it is that too many scripts are activated. Situational cues, then, act as external stimuli that invoke a cognitive schema that specifies beliefs, expectations and behavioral guides. Social norms are embedded into scripts. A script is activated once a situation is categorized. This means that the individual can associate the context with expectations about what other people think is the acceptable way of behaving in that kind of situation and about how others actually behave.

This view of social norms, then, provides an answer to the question about the process through which individuals recognize the existence of norms. The most direct implication of the theoretical model is that social norms are clearly contingent. The

activation of a particular norm depends on the characteristics of the context, so they are understood as rules that apply to certain situations.

Framing effects are important in the process of interpretation and activation of a particular social norm. The way in which a situation is presented affects the perception and interpretation of the cues (Kahneman and Tversky, 1973; Thaler and Sustein, 2008). Therefore, the meaning given to a situation and the resulting actions are susceptible to manipulation. The social norms that are considered to apply in certain contexts can vary if the characteristics that are primed are also different. This gives leeway to the promotion of behavioral change.

The efforts to supersede the traditional view in economics of the process that leads to behavior have allowed us to find more realistic models and explain many observed actions that seem to be at odds with individuals' self interest. It is very difficult to deny the relevance of social norms nowadays, and Bicchieri's theoretical approach enables us to understand the mechanisms through which social norms operate.

2.2. The role of social interactions

Once we have a more clear idea about the basic elements of social norms and the characteristics of the operation process, the following question that must be posed refers to the role that social interactions play in the emergence and stability of social norms. As mentioned above, the compliance with a norm is conditional on personal expectations about others' behavior and opinions. Thus, the information that a person has about the people around her is a crucial determinant of her behavior. Such information can be obtained through different sources, but the most common and relevant channel is through social interactions. When individuals are faced with a new situation, each of them has an idea about the scripts that guide behavior in similar contexts. Group communication facilitates that people act according to a common

script, so that personal expectations get confirmed and social norms become stable. Social interactions enable individuals to form shared expectations about appropriate behavior and the extent to which such behavior is actually adopted in the population. Sharing beliefs and expectations makes coordinated action possible. On the other hand, a lack of transparent communication may have the negative effect of helping the persistence of norms that bring very bad consequences for people and the society as a whole. Obstacles in the functioning of open communication may lead to widespread misperception of social reality. One of the possible scenarios that can result from this problem is the one characterized by *pluralistic ignorance*. Social psychologists have coined this term to define a situation in which individuals make systematic mistakes about other people's beliefs, attitudes and motives. Such errors are very common when, in addition to lack of transparent communication, people have a public attitude that does not correspond with their private opinions and beliefs. Their public behavior is interpreted as if it represented their private thoughts (Kuran, 1997). The implication for the expectations that support social norms is that an individual in the group infers from the observation of public behavior that the norm is widely supported and such behavior is considered the acceptable way of acting. If those expectations reach the personal threshold, then the individual will conform to the norm even when the behavior is not coherent with her beliefs and attitudes. Her public stance is, in turn, observed by others, who will wrongly interpret it as a genuine representation of her personal attitude. This process of informational cascades favors the stability of inefficient norms.

The crucial role of interpersonal interactions has been analyzed in depth in theoretical and empirical studies about collective action (Schelling, 1971; 1978; Granovetter, 1973; 1978) and the diffusion of innovations (Rogers, 1995). The information about other people's actions and opinions that is spread through social interactions is a key factor in the explanation of behavioral change. Such information is supposed to be especially relevant in situations with high levels of uncertainty. That is the case when

important social, political or environmental changes force people to face a new context. Interpersonal interactions provide, then, two types of valuable information. On the one hand, individuals receive factual knowledge about the new situation and the range of reactions that have taken place. This process has been called *social learning*. On the other hand, *social influence* refers to the fact that interpersonal interactions enable individuals to update their expectations about the extent to which certain behaviors are adopted by others and the social acceptability of each of them (Montgomery and Casterline, 1996). The operational theoretical distinction between these two types of effects of social interactions on individual behavior has been the basis of many empirical studies of demographic changes. More specifically, this approach has mostly been applied in the research on the diffusion of family planning (Bongaarts and Watkins, 1996; Kohler *et al.*, 2001; Kravdal, 2002). Some authors have examined the relevance of the social network structure in order to distinguish between social learning and social influence processes (Kohler *et al.*, 2001; Behrman *et al.*, 2002). The clearest scenario of social learning is that in which the effect of the content (which is usually measured as the proportion of network partners who have certain attitudes or behavior) diminishes with the density of the network. The network partners in sparse networks do not interact with one another, but act as quite independent sources of information (Kohler *et al.*, 2001). This would be the situation in which Granovetter (1973) identifies "the strength of weak ties".[1] Finding a non-significant interaction between the content and the structure is also interpreted by these authors as evidence of social learning (Helleringer and Kohler, 2005). On the other hand, social influence processes take place when the influence of the content is enhanced by the density of the network.

[1] It is poorly justified, nonetheless, why the proportion of interactions of certain types is taken instead of an absolute measure when exploring social learning, since the relevant thing is the process through which individuals receive information that reduces their uncertainty.

This approach has also been used in research about the impact of the social environment on the adoption of HIV preventive attitudes and behavior (Helleringer and Kohler, 2005; Kohler *et al.*, 2007). Most studies have focused on estimating the influence on positive attitudes towards preventive practices, at the expense of offering evidence about the effect on preventive behavior itself. Some exceptions are Zulu and Chepngeno (2003) and Clark (2010), which examine spousal communication about AIDS and extramarital sex, respectively.

2.3. Social norms, social interactions, and HIV preventive behavior

The characteristics of the HIV/AIDS epidemic in sub-Saharan Africa have been described in the first chapter of the dissertation. One of the most striking features is that sexual relations in marital or cohabiting couples account for most new HIV infections in southeastern Africa. The relevance of married people's behavior for the spread of the disease, however, does not square with the strategies of prevention programs. Only a few of them are targeted at formal couples. Most efforts have been made to promote preventive practices before or outside marriage. In the academic field, several scientists have realized that we need to know more about the factors that hinder or facilitate the adoption of preventive behavior by married individuals and couples.

Marital unions, like any other type of interpersonal relationship, are affected by social norms. One of the norms that is expected to have a crucial impact on preventive behavior is that which refers to the acceptability of sexual intercourse outside marriage. Fidelity is normatively supported in sub-Saharan African countries, such as Kenya and Malawi. Husbands and wives are supposed to limit their sexual relations to the marital arena, and extramarital affairs are responded with marriage instability or divorce. Divorce rates in Malawi have traditionally been high, as has been observed throughout the twentieth century

(Mitchell, 1951; Kaler, 2001). However, there is significant variation among regions, "over 50% of first marriages dissolve within 15 years" (Reniers, 2008: 420) in some parts of the country. Sexual infidelity is considered one of the most frequent reasons for divorce.

An extensively followed norm of sexual fidelity may have positive consequences regarding the spread of HIV among the population. A situation where extramarital relations are very rare slows down the spread of the disease, since the HIV infection gets trapped in smaller sexual networks. However, the norm may also bring negative consequences for the diffusion of preventive practices. The discussion about AIDS between spouses and the use of condoms within marriage are likely to be avoided because they conflict with the compliance of the fidelity norm. Suggesting condom use within marriage as an HIV preventive method in sub-Saharan Africa implies that one of the spouses has been or is suspected to have been unfaithful, since HIV is mainly transmitted through heterosexual sex. Besides, it is unlikely that the desire to use condoms is derived from the fear that the spouse was infected before marriage, since such fear would have prevented the individual from marrying that person. Thus, the interpretation of condom use within marriage as a response to the perception of HIV risk caused by the suspicion of infidelity implies a failure to comply with the social norm.

Nevertheless, the fidelity norm in sub-Saharan countries is not extensively followed, although most people in the region agree that having no extramarital sexual partner is the proper way of behaving. Extramarital sexual relations are not a rare phenomenon, as illustrated in Chapter 1. This ambiguous situation is especially harmful, since the normative support of the norm hinders the adoption of preventive practices by married couples and laxity in the compliance with the norm facilitates the spread of the disease, given the lack of generalized condom use outside marriage. The considerable frequency of extramarital sex can be interpreted as evidence of the weakness of the fidelity norm, at least for certain people in particular social contexts.

As such, a central question that should be explored is: who are the people that do not obey the fidelity norm? According to the theoretical model that Bicchieri (2006) has developed, compliance with a norm is conditional on both empirical and normative expectations. Thus, one of the aims of this research must be to test whether the individual's expectations about others' behavior and attitudes influence her own behavior and attitudes. In general, it could be expected that those people who believe that the dominant behavior in the group is compliance with the norm are more likely to abide by it than those who perceive that a considerable share of the group is breaking the rule. Analogously, individuals who believe that there is agreement on the unacceptability of having extramarital sex tend to conform to the fidelity norm, while failure of compliance is expected to be more frequent among those who have lower normative expectations on this issue. Therefore, a very interesting task would be to explore the effect that conflicting empirical and normative expectations have on individuals' behavior and attitudes. Unfortunately, the datasets that I use in the empirical sections do not provide specific information about normative expectations, so it is not possible to focus the analysis on testing this conflict. However, the exploration of the data and the conclusions of other studies (Tavory and Swidler, 2009) lead me to assume that almost everyone in the populations under study have high expectations about the normative support of the fidelity norm. As shown in Chapter 1, most people in rural Malawi and Kenya agree that extramarital sex is not the way one ought to behave. Thus, the variability in compliance with the norm seems to be more related to the heterogeneity in the empirical expectations than in the normative ones. As such, the main objective of the research is to estimate the effect that the empirical expectations about compliance with the norm in the group have on individual behavior and attitudes.

Extramarital sexual relations are not the only practice related to married people's HIV preventive/risky behavior. Some other activities have a considerable impact on their risk of HIV infection. The study of the selection of sexual partners that are

considered less likely to be infected could also be of some interest. Some scientists (Kaler, 2004; Watkins, 2004) have argued that one of the prevention strategies that are most used by married and unmarried men is the careful selection of partners. Watkins shows that people know that it is not possible to infer if someone is infected by HIV just by looking. Around 90% of men and nearly 85% of women in Malawi and Kenya agree that a healthy looking person might be infected (KDHS and MDHS). However, other criteria for selection are used, although no consensus exists among the population about the most effective ones. Many men think that sexual intercourse with young and single women is less risky, either because they have had few sexual partners or because they have been more exposed to prevention campaigns. Other men do not agree with this argument, since they think that young women are more promiscuous and more likely to be infected than older married women (Watkins, 2004).

An alternative strategy that notably reduces the risk of HIV infection is the use of condoms with any extramarital partner. Commercial sexual relations are the context where the rates of condom use are highest, although protected sex is still not generalized.[2] However, the use decreases as the emotional involvement or the duration of the relationship increases, since the social norms that regulate each kind of partnership are different. The type of relationship with extramarital partners ranges from a one-night stand to a stable affair, so the levels of condom use outside marriage that can be registered and the factors that can influence this preventive practice are expected to vary very much indeed.

The previous preventive strategies are related to the risk of being infected by partners other than the spouse. Married women are not passive agents that stoically accept the risk of getting

[2] According to the most recent DHS, among those men in Malawi who report having had commercial sex in the last 12 months, around 40% used condoms the last time. In Kenya, the levels of use are much higher among urban men (80%), but still low among rural men (54%).

infected by their husbands. They play an active role in spite of social norms that constrain women's capacity to negotiate with their husbands in the sexual arena, as is the case in other contexts. One of the strategies that married individuals, especially women, take into consideration is discussing AIDS with the spouse with the purpose of persuading him/her to be faithful (Chimbiri, 2006; Kohler *et al.*, 2007). The discussion usually deals with the issue indirectly, with no specific reference to the partner's behavior, and emphasizing the dangerous consequences for the children (Zulu and Chepngeno, 2003). Spousal communication is considered a preventive strategy in the literature about HIV/AIDS-related behavior, however, the evidence of the benefits in terms of risk reduction among sub-Saharan couples is very limited (Gage and Ali, 2003). A more detailed analysis of the communication process, paying attention to the type of messages and the role of each interlocutor, would improve the research study.

The option of divorce has also been identified as a tool for avoiding the risk of infection from an unfaithful spouse (Reniers, 2008). The likelihood that a marriage ends in divorce seems to have increased during the times of AIDS in Malawi, and the suspicion of infidelity is an important predictor of marriage dissolution. In this country, both men and women can initiate the process of divorce under certain circumstances, among which extramarital sexual activity is a frequently claimed one.

Finally, condom use within marriage is a preventive practice that may help to reduce married individuals' likelihood of HIV infection, aside from avoiding an increase in orphaned or HIV infected children.

The study of all the mentioned preventive strategies may contribute to the understanding of the spread of the HIV/AIDS epidemic, since they are all expected to have some impact on the risk of infection among married individuals. However, the empirical analysis of this dissertation focuses only on two of them: extramarital sexual behavior and condom use within marriage. Both theoretical and practical reasons limit the scope of this work. Beyond the general interest in improving our knowledge about the

factors that encourage or hinder the adoption of HIV preventive practices in southeastern Africa, the challenge of exploring the mechanisms through which social interactions affect preventive behavior has motivated this research. As shown in this chapter, interpersonal interactions might have a notable impact on an individual's behavior and attitudes because they affect the process through which action is influenced by social norms. The fidelity norm is especially relevant because it regulates sexual behavior outside marriage and affects sexual behavior within marriage. Having extramarital sex or not is expected to be clearly influenced by this norm. However, this is not the only practice that might be determined by the norm. In two of the empirical chapters, I will explore whether the use of condoms within marriage and the personal attitude towards this preventive behavior are influenced by the personal expectations about the extent to which the fidelity norm is followed in the group of reference. As shown in Chapter 1, suggesting condom use to a spouse implies the suspicion of infidelity or the fear of infecting the spouse because one has been unfaithful. In any case, using condoms as a preventive practice conflicts with obeying the fidelity norm. However, this should not be the case if condom use is negotiated as a contraceptive method. In sub-Saharan countries such as Kenya and Malawi, condom use is above all associated with protection from Sexually Transmitted Diseases (STDs) and HIV. Nonetheless, condom use has a twofold function –for prevention and contraception. In one of the empirical chapters, where I explain the individual attitude towards condom use within marriage, I explore the relevance of the meaning of condom use and, more specifically, the role of social interactions in modifying the interpretation of this practice. As a theoretical basis, I take into account Bicchieri's description of the cognitive process through which individuals recognize the norm that applies to a particular situation and her emphasis on the interpretation of the context as the determinant of the activation of certain scripts. Group communication usually leads to a renegotiation of meaning that generates a common understanding of the situation. Thus, one aim of the dissertation is to examine if the perceived emphasis

within the group on one of the two functions of condom use at the expense of the other affects the attitude towards this practice within marriage.

The use of contraception, however, is also affected by social norms. Marriage is viewed as the context where, not only legitimate sex, but also reproduction is embedded. Spouses are expected to provide children. Therefore, the use of condoms within marriage as a contraceptive method makes sense only when the couple has reached the desired number of children or, before that, when they want to space their births. It should be expected, then, that the promotion of an alternative interpretation of condom use can only have some impact on HIV protection in couples that have had some children. The acceptance of modern contraceptive methods in the south and east of Africa has dramatically increased in the last decades. As some research studies show, a reduction in the desired number of children, triggered by a shift in fertility norms, has helped the introduction of modern methods in reproductive behavior (White *et al.*, 2007). In addition, the high rates of HIV in these countries have also contributed to altering fertility intentions among those people who think or know that they are HIV-positive (Yeatman, 2009). Therefore, even when condom use within marriage is affected by the couples' duty of childbearing, the interpretation of condoms as contraceptive methods may facilitate its use with a spouse.

Understanding condom use within marriage is pertinent because, as mentioned above, most new HIV infections in the region occur in marital or cohabiting couples. In addition, this research can improve our knowledge about protected sex in formal or lasting sexual relationships, even outside or before marriage. Condom use with sexual partners other than the spouse is expected to depend very much on the type of relationship (conditional on the duration and the varying degrees of commercialism). So, certain conclusions can be applied to the use of condoms in extramarital sex. A practical reason has also dissuaded me from taking condom use outside marriage as the dependent variable. Reported extramarital sex is a minority phenomenon, so studying

condom use with extramarital partners by married individuals is likely to imply an important decrease in statistical efficiency, given the small number of cases. This reasoning can also be applied to the decision to not explore divorce and the selection of sexual extramarital partners as preventive strategies. As will be pointed out in Chapter 3, where the data are fully explained, limited available information and the small sample sizes hinder the examination of these questions. Finally, spousal communication about AIDS has been ruled out as well because of constraints in the design of the questionnaires that I will further explain.

CHAPTER 3. DATA AND METHODS

This chapter provides information about the characteristics of the data used in the empirical analyses. Detailed information about the construction of the variables used in each analysis will be shown in the corresponding empirical chapters; however, this chapter contains a preliminary discussion about the measurement of social networks. In addition, the two most relevant methodological challenges are identified in this chapter, and a thorough explanation of the suitable statistical techniques for dealing with these problems is put forward.

3.1. Data

The datasets that are used in the empirical analyses come from the *Kenya Diffusion and Ideational Change Project* (KDICP) and the *Malawi Diffusion and Ideational Change Project* (MDICP). Both projects have been housed by the Social Networks Project, based at the Population Studies Center of the University of Pennsylvania. The general aim of both the KDICP and the MDICP is to examine the role of social interactions in changing attitudes and behaviors mainly related to family planning and HIV/AIDS. In order to offer a more complete view of these issues, the research team has made a qualitative and a quantitative data collection. The former consists of a set of semistructured interviews and focus groups. In this research I only make use of the quantitative data, which have been obtained through two

longitudinal household surveys, one in each country. The quantitative data from the KDICP was collected in four rural sites in the Nyanza Province in southwest Kenya: Kawadghone, Owich, Wakula South and Obisa. The first wave was carried out in 1994-95, and 925 ever-married women of childbearing age and 859 men (of which 672 were husbands of the currently married women) were interviewed. These people and new spouses were reinterviewed in 1996 and 1999. A comparison of some variables in this survey with the corresponding ones in the nationally representative 1993 Kenya Demographic and Health Survey shows that the data represent the population in the province reasonably well (Watkins *et al.*, 2003). The MDICP was conducted in three rural districts, one in each of the regions in which Malawi is divided: Rumphi District in the North region, Mchinji District in the South, and Balaka District in the Center. The first wave was carried out in 1998, and 1,541 ever-married women aged between 15 and 49 years old and the husbands of the currently married women were interviewed. The second wave took place in 2001. New spouses were added, and respondents who could not be located in 1998 were interviewed. In 2004, the sample increased with the addition of a random sample of adolescents in order to correct for the underrepresentation of young females due to aging and it also included non-married individuals. In 2006 the spouses of married adolescents were also interviewed. Although the sample was not designed to be nationally representative, the responses are quite similar to those offered for comparable questions by the rural population in the nationally representative Malawi Demographic and Health Survey (Watkins *et al.*, 2003).

The categorization of respondents as married individuals in the MDICP and the KDICP relies on their self-reported descriptions of their marital status, regardless of whether or not there had been a public ceremony. Moreover, currently married respondents refer to those that are either married or living with a partner. Such an inclusive definition of marriage does not allow us to examine differences in behavior between types of unions. However, it is

more coherent with the institution of marriage in sub-Saharan Africa. As Meekers (1992) explains, African marriage is a process composed of several stages, rather than a discrete event defined by a ceremony. Moreover, no universal pattern of sequence of events exists. There is notable variation within countries in the timing of three events –first sexual relation with the spouse, first cohabitation and marriage ceremony (Meekers, 1992). In fact, coresidence of the spouses does not take place in some matrilineal systems. For that reason, some authors (Meekers, 1992; van de Walle, 1993) have pointed out that conclusions about changes in age at first marriage over time based on reported exact date of marriage might be incorrect, especially since such a date is used as a proxy for exposure to the risk of pregnancy.

However, important shifts in the process of marriage seem to be happening in the region. Polygamous marriages are decreasing, nuclear households are more common, especially in urban areas, and the selection of a spouse is more and more an individual choice (Chimbiri, 2007; Smith, 2007; Clark *et al.*, 2010). In rural Malawi, although many marriages are still mediated by a counselor (*ankhowse*), young people expect to choose their spouses (Poulin, 2007). Romantic love has become a key criterion for marriage in sub-Saharan contexts and suspicion of infidelity is usually an important reason for ending a relationship before it transitions towards marriage (Clark *et al.*, 2010).

Two more waves, 2008 and 2010, have been added to the Malawian longitudinal survey, since it is a currently ongoing project. However, the main purpose of the project has shifted, and the research team is now more interested in examining the mechanisms through which families and communities cope with the consequences of high morbidity and high mortality that the epidemic has brought to their lives. The name of the project is now *Malawi Longitudinal Study of Families and Health* (MLSFH). The new questionnaires do not include sections on communication networks about family planning and AIDS, but added are questions about investments in children's education and intergenerational and non-intergenerational transfers that might

help to cope with crises, such as famine, health problems, or other events.

At least two studies have analyzed in depth the quality of the KDICP and the MDICP datasets (Bignami-Van Assche *et al.*, 2003; Anglewicz *et al.*, 2009). Sources of non-sampling error, such as interviewer effects, response unreliability and sample attrition, have been investigated. The studies have found some problematic effects, although they are of similar magnitude to those observed in comparable studies. As could be expected, the interviewer effects, which refer to the influence of both the interviewer's conduct and her/his characteristics, are greater for presumably sensitive questions than for background characteristics. Regarding response reliability, inconsistencies in reporting background characteristics across waves range from 5% to 15% of the respondents. Finally, the KDICP data have higher attrition rates than those of the MDICP: 33% and 28% of men and women of the first wave in the KDICP were not successfully re-interviewed in the second wave, while 16% and 19% of men and women in the first wave of the Malawi data were lost in the second wave (Bignami-Van Assche, 2003). Table 3.1 specifies the reasons for attrition between the first two waves. The most relevant reason is short- or long-term mobility, especially in Malawi.

Refusal rates are especially low in the Malawi data, which reflects a more successful job done in this sense. A summary of sampling and key sample characteristics in all the waves between 1998 and 2006 of the MDICP survey is presented in Table 3.2.

Table 3.1. Reasons for attrition between the first and the second wave of the KDICP and the MDICP surveys

	KDICP				MDICP			
Reasons for attrition	Men		Women		Men		Women	
	N	%	N	%	N	%	N	%
Away or moved	96	47.8	119	58.6	154	78.6	218	73.7
Unknown or not found	36	17.9	32	15.8	14	7.2	24	8.1
Refused	26	12.9	20	9.9	4	2.0	1	0.2
Sick or hospitalized	6	3.0	3	1.5	1	0.5	4	1.4
Deceased	37	18.4	20	9.9	22	11.2	42	14.2
Other	0	0.0	11	4.4	1	0.5	7	2.4
Total	201	100.0	205	100.0	196	100.0	296	100.0

Source: Table included in Bignami-Van Assche *et al*., 2003.

Table 3.2. MDICP sample characteristics

	MDICP 1	**MDICP 2**	**MDICP 3**	**MDICP 4**
	1998	2001	2004	2006
Number of respondents	2,602	2,548	3,298	3,950
Target age range (females)	15-49	18-52	15-55	17-57
Response rate to survey	78.6%	72.1%	67.0%	69.5%
Attrition rate	-	14.9%	21.6%	19.8%

Source: Part of a table included in Kohler (2001).

[1] Response rate refers to the percentage of persons for whom interview was completed. Non-completion was due to refusal, which was minimal, and migration or death of respondents.

The mentioned studies have found that the respondents' attrition status is associated with some factors such as age or level of education in the Kenya and Malawi data. However, the distortion effects of attrition are not relevant in the Kenya data and in the last waves of the Malawi survey. The parameter estimates in multivariate analyses are not affected by changes in the sample due to attrition. Bignami-Van Assche *et al.* (2003), however, find some significant variations in the estimates generated by attrition between the first and the second wave of the Malawi data.

The KDICP and MDICP longitudinal household surveys offered a unique data collection since they provide information about both social networks and individuals' attitudes and behavior related to HIV/AIDS and family planning. The combination of these two types of information enables us to research the role of interpersonal interactions in attitudes and behavior, precisely the general aim of the dissertation. Unfortunately, the KDICP put more emphasis on family size and contraception topics, so some of the key variables in the analysis are not available for Kenya. Such variables mainly refer to preventive/risky behavior. Therefore, two of the three empirical chapters are focused on the study of the Malawian sample. However, the KDICP provides, in addition to the information about HIV/AIDS communication networks, very valuable information about family planning communication networks, which only the early waves of the MDICP offer as well. These data are used in Chapter 5, where I analyze the influence of the dominant attitude in the network towards each of the two functions of condom use on individual attitudes towards condom use within marriage.

The surveys include questions about most of the dependent variables that were identified in the previous chapter as relevant behaviors for the spread of HIV in the south and east of Africa. However, the quality and availability of the information related to each of them varies very much. As I have clarified before, the specific topics analyzed in the dissertation are the extramarital sexual activity of individuals, their attitude towards condom use with a spouse, and the actual use of condoms within marriage.

Information about extramarital behavior is available in all Malawi waves, but the KDICP only includes this question for men in one wave. As such, I only used the Malawi data, since data in more than one point in time are required for the longitudinal analysis. The information about the attitude towards condom use is better extracted from the Kenya data, although a proxy measure is constructed with the Malawi data. Thus, both samples are studied. On the other hand, questions about the actual use of condoms within marriage have only been included in the last waves of the Malawi survey, which constitute, then, the database for this analysis. It is important to note that the information about condom use with extramarital partners is also provided by the same data waves, however, the number of cases who report having had extramarital sex in the last year and having used condoms is very small. The dissertation does not then tackle this issue.

Concerning other interesting variables to be examined, it should be noted that questionnaires of the 2001, 2004, and 2006 waves in the Malawi longitudinal survey have been designed to obtain information about the respondent's marital history. Even the reason for marriage dissolution (if the marriage ended) is asked. An analysis of divorce as a strategy to avoid HIV infection could be made with retrospective data, as some studies show (Reniers, 2008). However, it would not be possible to estimate the influence of social interactions and suspicion of unfaithfulness on this behavior, since the causal order would not be guaranteed. A longitudinal analysis of the transition to the divorce status could solve this problem (Reniers, 2008). Unfortunately, too many inconsistencies between the reports of the same individuals between one wave and the next have dissuaded us from carrying out this task.

Regarding spousal communication about AIDS, considered as a preventive strategy against HIV infection, the Malawi questionnaires include the question: *Have you ever talked to your spouse about the chances that you or she might get infected with AIDS?* Several problems are derived from this approach to the issue. On the one hand, the question does not specify the moment

in time when the conversations took place, so they could have occurred in the distant past. On the other hand, it is a very vague question, and almost everyone in the sample answers 'yes'. The last two waves of the Kenyan data, however, offer more detailed information on spousal communication about AIDS. The last time that the spouses talked is asked in both waves, although the spouse's specific opinion about the best protection against infection is only included in the questionnaire of the last wave. Therefore, some analyses could be made with these data to explain the likelihood of discussing this topic with a spouse. I have decided, however, not to perform this kind of analysis, since some research has already been done (Zulu and Chepngeno, 2003; Kohler *et al.*, 2007), and I consider that, at this point, it would be much more relevant to find out if this activity actually increases the chances of adopting HIV preventive behaviors and in what sense. Unfortunately, this task is not feasible with the Kenya data since sufficient information about preventive/risky behaviors, such as extramarital sex and condom use either with a spouse or other types of partners, is not available.

Finally, the careful selection of extramarital partners in order to reduce the risk of infection cannot be properly studied with these datasets because of a lack of information.

3.2. Measuring social networks

The central explanatory variables in the three empirical chapters refer to characteristics of the ego's social network. The MDICP and KDICP do not provide information about the respondents' social network in a general sense, but about particular communication networks. On the one hand, most waves in each longitudinal survey include the questions: "*How many people other than your husband or partner have you chatted with about AIDS?*" and "*Could you please give me the names of four of these? The information will be completely confidential. You can also make up names if you feel more comfortable"*. A researcher,

then, can reconstruct the ego's communication network about AIDS, where the maximum number of network partners for each individual is four. On the other hand, the questionnaires of all the waves in the KDICP and the first two waves in the MDICP include the questions: "*How many people other than your husband or partner have you chatted with about child spacing/family planning?*" and "*Could you please give me the names of four of these? The information will be completely confidential*". Therefore, a communication network about this topic can also be reconstructed. In addition to these questions, several others are posed about each of the network partners' sociodemographic characteristics, and attitudes and behavior related to the topic. Moreover, the respondent reports if the partners in one network are the same partners he/she mentioned when talking about the other network.

Some interesting features of the respondents' communication networks about AIDS and family planning in each survey wave are shown in this chapter. Figures 3.1, 3.2 and 3.3 describe the composition of the networks in terms of sex, marital status and relationship between the respondent and his/her network partners. Regarding the ties, the respondent may mention male or female relatives (mother, father, sisters, brothers, and so on), friends, workmates or acquaintances, and others such as family planning CBD (Community-Based Distribution) agents, religious leaders, nurses, etc. In the MDICP and KDICP surveys, most network partners are friends or relatives of the same sex as the respondent. The variables shown in these figures refer to the percentage of married men and women who have a network in which more than half of the network partners have certain characteristic.

Figure 3.1 describes the composition of the AIDS communication networks by sex of the respondent in the four waves of the Malawi longitudinal survey. However, the information about the women's networks in the last waves, 2004 and 2006, is not shown because such data are not used in the empirical analyses of the dissertation. It is clear that men mostly talk about AIDS with other men and women with other women. A

great percentage of men and women have a network where more than half of the partners are of their same sex. The variability in terms of marital-status composition is also very small, since usually most married men's network partners are married as well. Unfortunately, the information about network partners' marital status is not offered in the first two waves. The observed networks are more heterogeneous in terms of the respondents' relationship to their network partners, although more than 60% of married men in the most recent waves have networks mainly formed by peers, that is to say by friends, workmates or acquaintances. In the oldest waves, 1998 and 2001, the share of married men and women who mainly talk about AIDS with same-sex relatives is bigger than in the recent waves, and it is even similar to that referred to those who mainly talk with peers in the case of women.

The networks formed by the people with whom the respondents talk about family planning, instead of AIDS, in the Malawi longitudinal survey are described in Figure 3.2. High levels of homogeneity in sex composition are also observed, although both men and women tend to have a higher proportion of women in these networks than in the AIDS communication networks. The composition of the networks regarding the type of relationship between the respondent and the network partners is also similar to that observed for the same waves in Figure 3.1.

Figure 3.1. Composition of the networks of communication about AIDS by sex of the respondent, Malawi survey (waves 1-4)

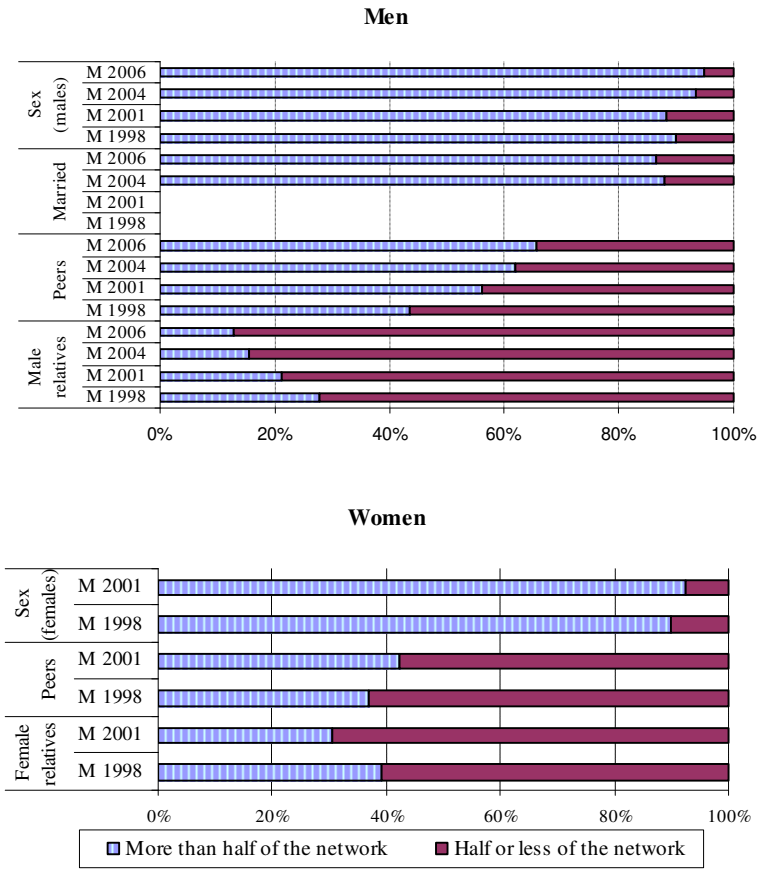
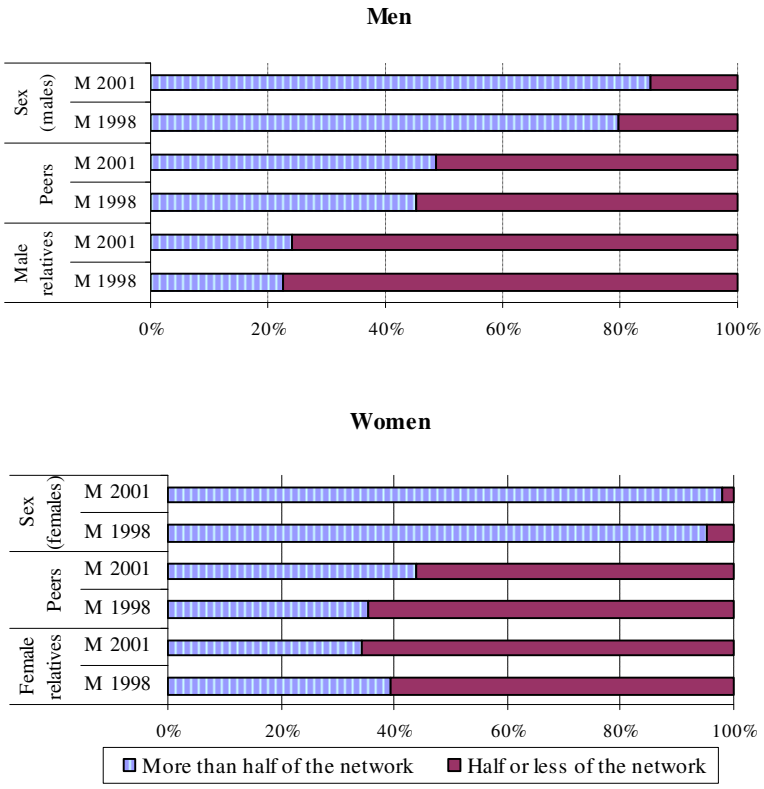


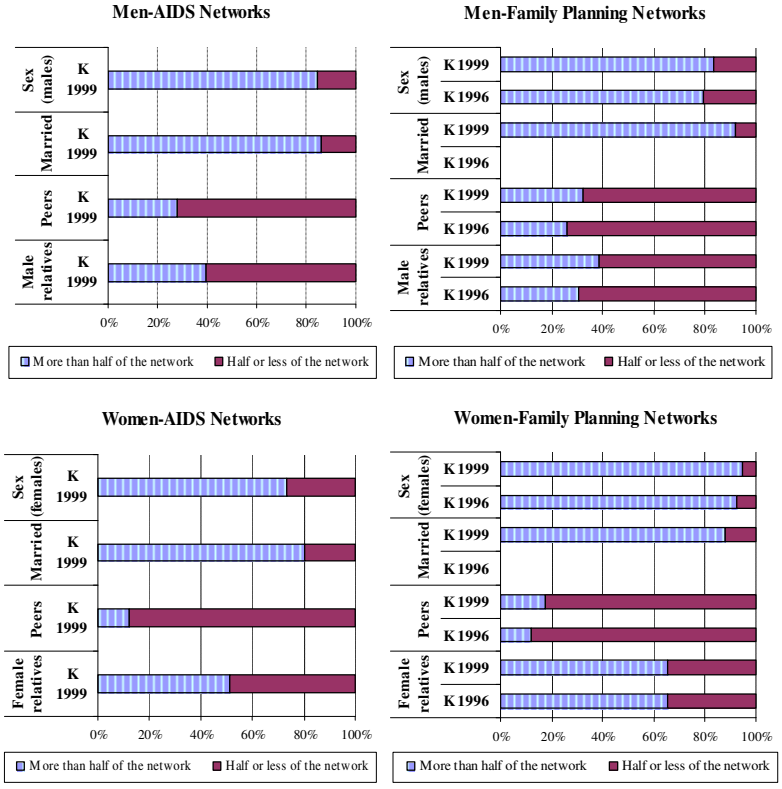
Figure 3.2. Composition of the family planning communication networks by the sex of the respondent, Malawi survey (waves 1-2)



An analogous description of the communication networks composition in the Kenya longitudinal survey is presented. Figure 3.3 summarizes all the available information. Unfortunately, it is not possible to know the characteristics of all AIDS communication network partners in wave 2 (1996) because of a mistake in the database construction. The relevant questions are not asked again if the network partners are the same as the previously mentioned ones in the family planning communication

network, but the database does not allow to link the information about the two types of networks.

Figure 3.3. Composition of the communication networks (about AIDS and family planning) by the sex of the respondent, Kenya survey (waves 2-3)



The clearest difference between the Kenya and the Malawi egocentric networks is that the share of networks in which most people are respondent's friends or acquaintances (peers) is smaller

than in the Malawian case, particularly among women. Kenyan women are more prone to talking about AIDS and especially about family planning with female relatives such as a sister-in-law. In addition, women's networks of communication about AIDS are less homogenous in terms of sex composition.

In sum, rural married women and men in both countries tend to have informal conversations about AIDS and family planning with people who are similar and close to them. Very few respondents mention a network partner that is not a relative or a peer. In fact, the term peers mainly refers to respondent's friends, since very few married men and women in both countries mention some workmates or acquaintances as network partners (Figures 3.4 and 3.5). Moreover, brothers, brothers-in-law, sisters and sisters-in-law are much more frequently reported as interlocutors than parents. It seems, then, that the age difference between the respondent and his/her network partners is minor. Thus, married individuals usually talk with married friends and relatives of their same sex and similar age about topics related to reproductive and sexual health.

One of the social network variables used in the empirical analyses of this dissertation is the proportion of network partners who have had extramarital sex in the last 12 months. In order to construct this measure, I have used the information extracted from the responses to some of the questions about the people with whom the interviewees have talked about AIDS. Respondents are asked about each network partner's marital status and the number of sexual partners apart from spouses that the respondent thinks the network partner has slept with in the last year. A previous question in the questionnaire refers to the best married friend's extramarital behavior. Thus, before proceeding to ask about the network partner's extramarital sexual relations, a filter question asks if the network partner is the same person as the mentioned best friend.

Figure 3.4. Frequency of respondents who report no network partner that is a workmate/ acquaintance, by sex and type of communication network, Malawi (waves 2-3)

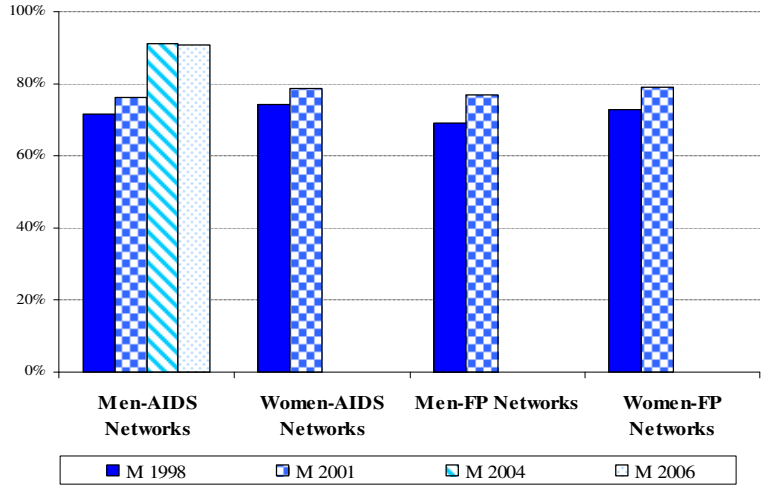
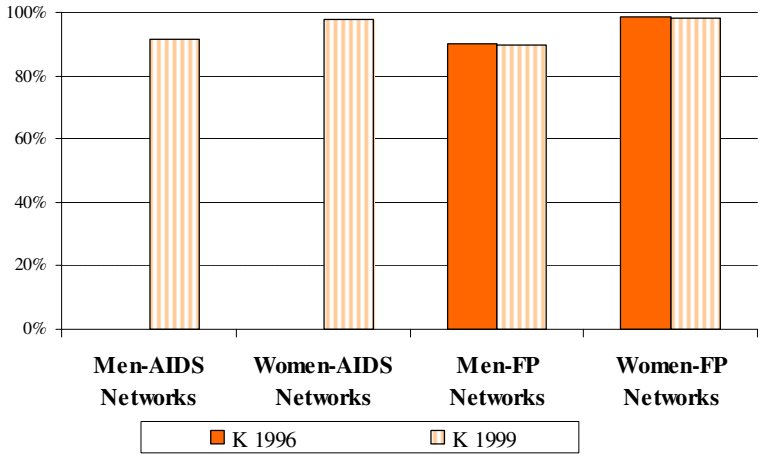


Figure 3.5. Frequency of respondents who report no network partner that is a workmate/ acquaintance, by sex and type of communication network, Kenya (waves 2-3)



The way in which the variable about the spread of unfaithfulness in the network is constructed must be carefully discussed. A measure of the proportion of unfaithful network partners can only be applied to those respondents who have talked with at least one person about AIDS, so it is only a proxy of the proportion of unfaithful partners in the social network. This is not very problematic since the percentage of married men (the analysis focuses on men's extramarital activities) who have no network partner is small, especially in the 2006 wave.[1]

Alternatively, since every person in the sample is asked whether his/her best married friend has had extramarital sexual relations in the last year, a different way of constructing the variable is possible so that it applies to all the respondents. Those respondents who have not talked with anyone about AIDS would be categorized as having one network partner –their best married friend-, and those who have talked with people neither of whom is their best married friend (a very infrequent case) would have a network formed by the network partners they mention plus the best married friend. Therefore, there is no need to have a category that refers to respondents without a network. This alternative construction is applied in Chapter 6 mainly for one reason: the model used in that analysis cannot be estimated if too many categorical explanatory variables with too many categories are included given the small number of cases in the analysis. As is explained in Chapter 6, the final variable has two categories: men with networks in which 50% or more of the partners have had extramarital sex, and men with networks where unfaithfulness is less spread. Nevertheless, I have preferred not to use this alternative measure in Chapter 4 because it involves some strong assumptions about the share of the sample who have not talked with anyone about AIDS. For instance, those whose best married friend has had extramarital sex are categorized as having a social network where everyone is unfaithful. Thus, even when the proportion of unfaithful partners in the communication network

[1] See Table 4.1 in Chapter 4.

about AIDS is only a proxy of the proportion of unfaithful partners in the social network, there is a clear definition of the criterion according to which the respondents are categorized.

The rest of the social network variables in the analyses are less problematic, because the network of reference coincides with the communication network. The variables refer to network partners' attitudes and behavior directly related to HIV/AIDS prevention or family planning. Namely, network partners' acceptance of modern contraceptive methods can only be known from those respondents who have talked with someone about family planning, and, likewise, it makes sense to think that a respondent can identify others' attitudes towards using condoms for preventing HIV infection if he/she has talked to someone about AIDS.

These longitudinal surveys also offer the opportunity to construct measures of density and other features of the network. The respondent informs about the type of links between the people in the network. In other words, the interviewee not only defines his/her relationship with every person in the network, but he/she also says if the partners are *confidents, just friends, acquaintances, they just know or they do not know* each other.

3.3. Methodological challenges

The study of how social interactions influence individual attitudes and behavior related to HIV prevention is not a simple task. It implies exploring the causal relation between the social environment and the individual, not just the association between the two things. Moreover, the analysis of intimate behavior might be problematic, since people are likely to misreport it or refuse to answer. Thus, scientists are required to use suitable methods that enable us to solve, at least partially, these problems, and to be conscious of the research limitations.

3.3.1. How to tackle the selection of social networks?

Probably the main challenge for scientists is to estimate causal effects. Longitudinal surveys contribute to the estimation of causal effects because they offer information about the same individuals over time. Thus, analyses with this kind of data enable us to consider not only differences in the dependent and independent variables between individuals, but also changes within individuals generated by shifts in their own characteristics and their environment. In addition, the cross-sectional analysis of survey data often faces difficulties in assuring that the causal order is indeed the one that is being assumed. In this regard, the study of the influence of social interactions on personal attitudes and behavior is especially problematic since the individual is likely to choose the type of people with whom she interacts. In other words, social network partners are not randomly distributed among the population, but tend to be selected according to some criteria. One of the most common reasons for choosing one person instead of another one is the search for similar people with whom one shares common tastes, features or interests. Homophily is, then, usually observed in social interactions (Katz and Lazarsfeld, 1955, Blau, 1994). If those features of the personality, for instance, also influence the behavior we want to study, the estimation becomes more complex. Besides, some people may have more opportunities than others of socially interacting. Geographic location and other factors can affect the outcome (behavior or attitudes) and, at the same time, influence the chances of having social contacts. Thus, a standard cross-sectional analysis of the effect of interpersonal interactions on the likelihood of having certain interests or behavior would be unable to disentangle such an effect from the influence that individuals with particular interests have on the type of social network. Similarity between the behavior of the individual and her network partners may not be the result of social influences, but a reflection of the fact that certain factors affect both things.

In order to illustrate this point, let's focus on one of the objectives of the dissertation. I am interested in examining the influence that others' extramarital behavior has on the likelihood of having sexual partners outside marriage. I need to take into account that those individuals who are more prone to having extramarital sex may also be more likely to have friends who practice extramarital sex. That would be especially the case of men who attend brothels and become friends of other men they meet there. As such, a high association between the individual's behavior and that of her network is easily found, but it could simply be derived from the tendency to have friends with similar interests and opinions.

The fact that social interactions are endogenous is especially problematic when the factors that influence both the network and the outcome are unobserved. Panel analysis with fixed effects has been used for dealing with this difficulty in several studies of the role of social interactions (Behrman *et al.*, 2001; Helleringer and Kohler, 2005). This methodological strategy does not involve the assumption that the unobserved individual-specific factors are not correlated with the regressors. The model would be the following one:

$$Y_{it} = \beta X_{it} + \delta N_{it} + f_i + \varepsilon_{it} \qquad (1)$$

where Y_{it} is the dependent variable by individual i at time t, N_{it} the social network variable for individual i at time t; X_{it} a vector of other observed variables for individual i at time t; f_i a vector of unobserved fixed factors (time-invariant) that are supposed to affect the dependent variable; and ε_{it} a random disturbance term for individual i at time t.

In the analysis with fixed effects, the unobserved characteristics that are time-invariant (f_{it}) can correlate with the other variables on the right-hand side of the equation (1) because the use of fixed effects allows us to control for all the observed and unobserved heterogeneity among the sample units that do not change over time. More specifically, this model conditions out the

fixed part from the residual and from all explanatory and control variables in the model. This implies assuming that the features that induce having social interactions and selecting certain network partners –such as the personality or the household location– do not change between waves. In linear panel-data models the estimation of the coefficients is obtained by appropriate differencing transformations. In order to illustrate this process, let's focus on the analysis with fixed effects of a longitudinal dataset with two waves. The differenced version of model (1) would be:

$$\Delta Y_{it} = \beta \cdot \Delta X_{it} + \delta \cdot \Delta N_{it} + \Delta \varepsilon_{it} \qquad (2)$$

where Δ denotes the differences in variables between the two waves at time $t + 1$ and t. The term f_{it} and all time-invariant control variables are canceled out.

In the case of logit analyses, this estimation process is not possible. However, the fixed component can be eliminated by conditioning on the maximum likelihood estimator. This implies that the sample is reduced to those respondents that experience a shift in their behavior (dependent variable). In a longitudinal analysis with two waves, the dependent variable for each individual must have value 0 in one wave and value 1 in the other wave, independently of the order. This is a drawback of the estimation process because the final number of cases is likely to be small and the standard errors of the coefficients high, so the statistical efficiency of the estimation process notably decreases. In addition, the assumptions of normality and homoscedasticity of the disturbance term are violated (Behrman *et al.*, 2001). Therefore, this analysis could lead to wrong conclusions, especially if the distribution of the explanatory variables in the subsample substantively changes.

I deal with this limitation by comparing the results of the logistic models with those of linear probability models. The dependent variable in linear probability models is continuous and refers to the expected probability of behaving in a specific way conditional on the explanatory variables in the model. This

procedure should solve the problems derived from the estimation of logit models with fixed effects, since the analysis of linear models with fixed effects does not imply the restriction of the sample.

3.3.2. Units of analysis: individuals vs. couples

Nearly all research studies about HIV preventive/risky behavior take individuals as units of analysis. Moreover, women and men are always analyzed separately. This is also the case in research about family planning and family size. However, this methodological strategy might have some caveats, since important preventive sexual behaviors involve more than one actor. This is the case of condom use. It has been observed that the same individual behaves in different ways depending on the type of sexual partner –spouse, boyfriend/girlfriend, steady-night partner, and so on. The likelihood of using condoms diminishes in formal and stable relations. As such, the study of condom use must take into account the type of relationship. But this is not enough. The characteristics of both actors should be included in the explanation. The use of condoms is not exclusively determined by the sexual context, but also the attitudes, knowledge, expectations, risk perception, etc. of the two people involved are supposed to shape the outcome. One way of introducing these features in a model is taking the information that the respondent reports about both herself and her partner. The advantage of this strategy is that there is no need to interview all sexual partners, but that each person informs about her partners. However, it makes sense to think that the data referring to the partners is likely to be of lower quality, especially if the sexual intercourse has taken place within a short-term sexual relationship in which partners do not know each other so well. An alternative strategy implies constructing the explanatory and control variables from the information that both partners provide. Obviously, to administer a questionnaire to all sexual partners of the individuals in the sample is extremely costly

and difficult. However, this strategy is plausible if we focus on marital relations. Some surveys, such as the Demographic and Health Surveys, interview husbands and wives, so they offer the opportunity of linking their reports. Thus, it is possible to test hypotheses about the influence that each spouse and his/her characteristics have on the likelihood of using condoms.

The mentioned methodological strategies introduce information about the two individual actors for the construction of the explanatory variables, but what about the dependent variable? Condom use refers to an action where two people are involved. However, most empirical analyses take one of the sexual partners' reports to construct the dependent variable about the behavior of the couple. This procedure would be the most suitable one if the reported behavior is exactly the same as the 'true' behavior, or at least, if both individuals, husband and wife in the case of marital sex, are equally likely to misreport their use of condoms. However, as is shown in Chapter 6, it is possible (and I would even say common) to observe significant discrepancies about the activities of the couple in husband and wife reports. This observation should alert us to be careful with the information that is used.

The statistical technique applied in the analysis of condom use within marriage that is included in the dissertation has been selected because it allows us to take into account the reports of both the husband and the wife, and, in turn, to work with couples instead of individuals as units of analysis. Latent Class Analysis (LCA) is an analogous technique to factor analysis, but it is used for studying categorical data (McCutcheon, 1987). It allows us to identify discrete latent variables from two or more observed variables.

Let's describe in detail the process through which latent variables are estimated. First of all, we observe that two or more categorical variables are correlated, but it is very unlikely or contrary to the theoretical argumentation that the association reflects a causal relation between such indicators. In fact, it is thought that the variables are correlated because they are derived

from the same unobserved variable. The manifest variables might be alternative indicators of the same concept or different effects of a common cause. Secondly, we are interested in identifying the latent variable. The objective of the LCA is to define a latent variable within which the manifest variables are locally independent. The fundamental condition of local independence means that the association between the manifest variables is found to be zero within the categories of the latent variable. In other words, a latent variable has to be estimated so that the association between the observed variables is not significant when we control for such a latent variable. The relationship between the variables (two in the example) is expressed in the following equation:

$$pr(A=a, B=b, X=x)=pr(A=a, X=x) * pr(B=b, X=x) * pr(X=x) \quad (3)$$

where A and B denote two manifest variables and X is the latent variable. Equation 3 states that the observed variables are locally independent, since the probability of occurrence in each cell is equal to the product of the conditional probabilities and the probability of being in a particular class of the latent variable.

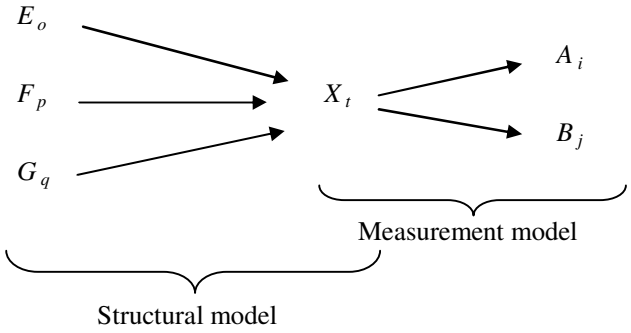
Maximum likelihood estimates of the conditional and latent class probabilities are obtained through an iterative estimation procedure. The goodness of fit of the model can be estimated using some statistics such as the likelihood ratio chi square, which evaluates the nearness of our model estimates to the frequencies actually observed.

The reason why LCA is used in the analysis of condom use within marriage in Chapter 6 is straightforward. Both the husband and the wife report the use of condoms by the couple. Since a considerable amount of discrepancies is observed, it is necessary to estimate the 'true' use of condoms by the couple. The reports of the spouses are, obviously highly correlated, because they are both derived from the same variable: true protected sex. The LCA uses

the information that both husband and wife provide, so we can construct a variable that measures the couple's behavior.

The purpose of the research study is to explain condom use within marriage, so the analysis would improve if condom use by the couple is simultaneously estimated as the cause of the spouses' reports and as a consequence of several factors. Log-linear simultaneous equation modeling enables us to test a model in which the latent variable is influenced by certain explanatory variables and, at the same time, shapes the manifest variables in the LCA. Figure 3.6 represents the general model.

Figure 3.6. The model is formed by two equations



Variables *A* and *B* are the observed variables in the LCA, *X* is the latent variable with *T* classes, and *E*, *F*, *G* are categorical explanatory variables of *X* with *I*, *P*, and *Q* categories, respectively –none of the variables can be a continuous measure when we use LCA for the estimation. The left side of the figure represents the structural model, while the right side refers to the measurement model. Figure 3.6 thus illustrates the two simultaneous equations.

To the best of my knowledge, the few studies that try to explain a particular preventive behavior of the marital couple taking into consideration the reports of both husband and wife about such behavior use a multinomial logit model. Zulu and

Chepngeno (2003) explore the factors that induce couples to discuss HIV/AIDS. The dependent variable has three categories: both husband and wife say that they have talked about this issue, both say that they have not, or, they give contradictory responses. Since this methodological strategy does not involve any unobserved construct, it is important to test if the model estimated with LCA offers a better account of the data. In Chapter 6, this hypothesis is tested, assuming that the models are nested.

CHAPTER 4. WHEN THE GROUP ENCOURAGES EXTRAMARITAL SEX: DIFFICULTIES IN HIV/AIDS PREVENTION IN RURAL MALAWI

4.1. Introduction

Most experts agree that mainly two convincing explanations about the disproportionate levels of HIV prevalence among the heterosexual population in Southeastern Africa have been put forward. First, the practice of male circumcision, which is widespread in other parts of the continent, is rare in the countries where the epidemic is more devastating (Halperin and Epstein, 2007). The circumcision improves male hygiene and makes the foreskin and glans less vulnerable to HIV infection. As a World Bank report explains, there is ecological, epidemiological, and biological evidence on the protective function of circumcision (Wilson and Beyer, 2006). In addition, some randomized prospective intervention trials are also offering strong support on this issue (Auvert *et al.*, 2005; Bailey *et al.*, 2007). However, this explanation is not enough for understanding the phenomenon, since the male population in other parts of the world, such as Europe and India, is neither exposed to this practice in a generalized way.

The other important explanation refers to sexual behavior, but it does not blame sub-Saharan people for promiscuous behavior. In fact, multiple studies have denied that the HIV prevalence

levels are due to African men having more sexual partners in their life course. On this matter, men in Rio de Janeiro or Thailand, for instance, seem to exceed sub-Saharan people, who are more similar to the heterosexual population in western countries (Santelli, *et al.*, 1998; Wellings *et al.*, 2006). Morris and Kretzschmar (1995; 1997) were the pioneers in explaining the reason why sexual practices are crucial for understanding the African epidemic.[1] They show that sexual networks where individuals have concurrent long-term sexual relationships, which are common in this region (Morris and Kretzschmar, 1997; Halperin and Epstein, 2004), facilitate the spread of the disease. In other words, given the same number of sexual partners per person, the diffusion of HIV is faster when individuals have more than one regular partner at the same time than when they have serial relationships. In addition, the infectivity or capacity to infect a person is much higher during a short period (about three weeks) after the individual gets infected (Pilcher *et al.*, 2004; Wawer *et al.*, 2005). Thus, concurrent sexual relations increase the risk of HIV transmission because of the sexual network dynamics and the 'acute infection' window. The empirical evidence about the impact of concurrency on the risk of HIV infection that has been provided is not as yet conclusive, mainly due to a lack of consensus about how to define and the most suitable way to measure this phenomenon (Lagarde *et al.*, 2001; Ferguson *et al.*, 2004; Mishra and Bignami-Van Assche, 2009). However, numerous scientists are working on this issue at present.

The argument about the relevance of concurrent relations, together with the facts that marriage is a universal practice in sub-Saharan Africa and that the median age at first marriage is about 18 years old among women and 23 among men in most of these countries (Uganda DHS 2000-01, Malawi DHS 2004, Lesotho

[1] Some years before, Watts and May (1992) had offered a mathematical explanation about the relevance of concurrent partnerships in the spread of HIV, although no reference was made to the patterns of sexual behaviour in sub-Saharan Africa.

DHS 2004, Zambia DHS 2007), makes the analysis of the factors that explain extramarital sex a crucial task for understanding the patterns of HIV epidemic in the region. Married people who have sexual partners outside marriage facilitate the spread of the disease, especially when the relationships outside are stable and the use of condoms is not generalized. The work by Dunkle *et al.* (2008) is very illustrative in getting an idea about the magnitude of the problem. They find that in urban areas of Rwanda and Zambia between 55% and 93% of the new infections via heterosexual intercourse have taken place in serodiscordant married or cohabiting couples. The relative importance of marital sexual relations has also been observed in other countries, such as Uganda, Swaziland and Lesotho (Khobotlo *et al.*, 2009; Mngadi *et al.*, 2009; Wabwire-Mangen *et al.*, 2009). Getting married does not work as a preventive strategy against HIV infection, since the percentage of HIV-positive women is much higher among those who are married than among those who are single of the same age (Glynn *et al.*, 2001b; Kelly *et al.*, 2003).

Men are more likely to bring HIV infection into a concordant-negative partnership (Hugonnet *et al.*, 2002). Extramarital sex seems to be more frequent among men than among women according to their reports in surveys.[2] It is not easy to know if these differences are real or derived from a female tendency to underreport their extramarital sexual behavior –or even a male propensity to over-report. But some investigations that gather data on biomarkers for HIV conclude that a man is twice as likely as a woman to be the first to get infected in the couple (Carpenter *et al.*, 1999; Lurie *et al.*, 2003). It must be noted, however, that de Walque (2007b) has observed that a relevant fraction of infected cohabiting couples in nationally representative samples of five African countries are those in which only the woman is infected. The author argues that such a finding is difficult to be explained in the absence of extramarital sex among married women.

[2] See the Demographic and Health Surveys (DHS) by country.

I focus this research on explaining married men's extramarital sex, since their behavior seems to be more relevant in the transmission of HIV/AIDS and the quantitative analysis of women's extramarital activity can be more complicated given the lack of variance. In particular, my intention is to examine whether the extent to which extramarital sex is (perceived to be) widely practiced in the social network has an impact on the individual's behavior outside marriage. The study is restricted to male behavior outside marriage in one country of southern Africa, Malawi, which is similar to other countries in the region in many socioeconomic and demographic features, as it has been explained in Chapter 1.

The chapter is divided in six sections. In section 4.2, I describe the Malawian social context as regards the extent to which extramarital sex is practiced and accepted. I also present the theoretical grounds of the research and the hypotheses in this section. Section 4.3 deals with the characteristics of the sample and the way in which the variables included in the empirical models are constructed. A description of the different statistical techniques that are used for analyzing the influence of social networks on extramarital behavior is presented in section 4.4. The results of the empirical analysis are commented in section 4.5, while I set out the final conclusions in section 4.6.

4.2. Social interactions and others' behavior

Some features of the cultural context should be taken into consideration in order to understand the relevance of extramarital sexual relations in Malawi, as in other countries in southern Africa. Several qualitative studies have pointed out that definitions of masculinity in the region are very linked to signs of good skills in the sexual domain such as the number of sexual partners (Varga, 1997; Kaler, 2003; Smith, 2007). Even more, the number of partners is also related to masculinity because it gives us an idea of the capacity to support economically, since men are expected to offer monetary and nonmonetary transfers to their

female sexual partners in informal relationships (Luke, 2006; 2007; Tawfik and Watkins, 2007). Some kind of economic exchange usually takes place in sexual relations, not only in commercial ones. In fact, even if women have diverse motives for having informal sexual relationships such as extramarital affairs, as Tawfik and Watkins (2007) have tried to show, the widespread idea, especially among men, is that women look for some economic aid because they suffer more intensely from poverty and have less access to money.

However, it could not be said that male unfaithful behavior is openly encouraged and normatively accepted. Only 7% of married men agree that it is acceptable for a married man to have sexual relations outside marriage, according to the data that I use in this empirical analysis about the rural population of Malawi (MDICP 2004).[3] Sexual infidelity is even viewed by the Malawians as the most frequent trigger event of marriage dissolution (Kaler, 2001). Moreover, the diffusion of many churches in Southeastern Africa where male and female infidelity is publicly condemned (Chimbiri, 2006; Clark, 2010) and the devastating consequences of the HIV/AIDS epidemic in the region may have forced people to reconsider certain norms, beliefs and definitions. Therefore, it makes sense to affirm that sexual fidelity in marriage is normatively supported.

Given the contradictory messages that a man can receive about the acceptability of extramarital sex and the variability in the individual perception of the risk of becoming infected with HIV, I expected to observe a substantial level of heterogeneity among husbands regarding their tendency to have sexual relations outside marriage. This statement is coherent with the theoretical explanation in which this research study is framed, which emphasizes the relevance of the social environment on the human behavior. Specifically, it is argued that the decision to have extramarital affairs depends on the individual's expectations about

[3] The abbreviation stands for Malawi Diffusion and Ideational Change Project.

what people think about such an activity and how they behave in this regard. Theoretical arguments about the mechanisms through which individual expectations and beliefs are updated and enforced in groups are useful for understanding the influence of such expectations on individual behavior.

In societies where access to mass media and the publication of public opinion surveys is very limited, the main channel through which individuals may know the dominant opinion, attitudes, and behavior is interpersonal communication. Informal conversations and community meetings such as those that take place in churches are crucial sources of information. "Group communication, when successful, generates common beliefs and expectations, which in turn make possible coordinated action" (Bicchieri, 2006: 176). The origins of interpreting the establishment of social norms, the diffusion of innovations, and collective action as coordination games may be found in Schelling (1971; 1978) and Granovetter's works (1973; 1978). In their models, the individuals' choice of an action or its alternative depends on the proportion of people in the group of reference that has already opted for that action. Once that certain proportion, which is different for each individual, has been reached, the person will change her behavior in accordance with the group.

In line with these models, Bicchieri (2006) affirms that the establishment of a social norm is conditional on the existence of a sufficient proportion of the population that prefers to conform to the rule if there is a sufficient proportion of the group that is obeying the norm (*empirical expectations*) and there is a sufficient percentage that believes that an individual ought to behave in such a way (*normative expectations*). In a subsequent work (Bicchieri and Xiao, 2008), the authors show that, when there is a conflict between the two kinds of expectations, individual behavior is especially influenced by the former. An example would be a context where the norm of paying taxes is largely violated, even when every citizen is expected to do his duty on this matter. An individual that observes this situation is likely to evade his taxes. Bicchieri provides a definition of social norms in terms of

preferences and expectations. Other authors, however, have highlighted emotions as the fundamental aspect of norms (Elster, 1989). In Elster's explanation of the enforcement of norms, he argues that moral norms shape behavior even when the individual is not observed by others, while social norms are based on the emotions provoked by the expected reactions of others. The author states that 'social norms operate through the *emotions* of shame in the norm violator and of contempt in the observer of the violation" (Elster, 2007: 355). Bicchieri (2010), on the contrary, considers that no sharp distinction can be made between affect and cognition, and emotions could be the result of the entrenchment of norms. In addition, she places less emphasis on the role of social punishment, although she recognizes that some individuals may need the threat of sanctions in order to conform to the norm. The author identifies three main reasons for norm compliance: fear of social sanctions, desire to please others' expectations, and the acceptance of others' expectations as legitimate (Bicchieri, 2006: 23-25). Social sanctions may play a key role in contexts where repeated interactions are very common. This would be the case of family and friendship relationships. Also, the desire to meet others' expectations is a more relevant motivation when the social distances are short.

The varying importance of the different motivations depending on the context leads us to link this approach to social network models, such as the contagion theory, which defend the relevance of the network structure for understanding the diffusion of innovations (Rogers, 1995; Scherer and Cho, 2003). Individuals are expected to adopt others' behavior depending on how close they are in the network. In models such as the one elaborated by Montgomery and Casterline (1996), the effect of each network partner on behavior has an associated weight, which is usually related to the degree of similarity between the individuals. In addition, the type of ties among the actors, strong or weak (Granovetter, 1973) affects the kind of information that flows and the influence processes that take place in the network. Norms and conventions tend to be enforced when interactions are intense and

frequent, when groups are small and able to generate strong social control and pressure on their members.

Concerning the specific topic of this research, the strength of the fidelity norm is expected to depend on people's perceptions about the prevailing extramarital behavior in their group of reference, which is known by the individuals through interpersonal communication. Those who think that nobody around them is unfaithful will tend to behave consequently, since they perceive that a clear norm exists that regulates these situations and they likely prefer to obey it. On the other hand, those who observe that extramarital relations are widespread will interpret that the norm is weak and that infidelity is, at least, tolerated. The contradiction they perceive between the normative support of fidelity and the low level of compliance decreases the likelihood that they identify a behavioral rule that induces them to be faithful. As such, the first hypothesis in the research is that the proportion of network partners that have had extramarital relations according to the respondent affects his sexual behavior outside marriage.

In addition to the previous objective, I also examine if the influence of the group on individual behavior depends on the type of ties among the members of the network. It is evident that the pressure of the group is expected to be greater when the network is dense and the ties are strong. Going back to the reasons for norm observance, the influence of others' behavior is stronger in this kind of social network not only because the threat of social sanctions is more obvious, but because individuals are more prone to desire to please others' expectations when they are linked to the others through intense emotional ties. Feeling accepted in the group is given great value, and a suitable way of succeeding is satisfying family and friends' expectations. But going even further, it can also be argued that actors in dense networks are aware that the information they have about others' opinions and behaviors is also shared by everyone else. They know that the regularities they observe, which are the grounds for identifying the social norms that regulate each situation, are perceived by the rest as well; they are of common knowledge (Chwe, 1999). So they

can be more confident that their behavior is based on common expectations.

It should be emphasized that, despite the substantial number of quantitative studies that have analyzed the role of social pressure and social networks on issues related with preventive behavior against HIV/AIDS (Helleringer and Kohler, 2005; Smith and Watkins, 2005; Kohler *et al.*, 2007), their influence on extramarital sexual activity is still a puzzle. The exception is a recent article (Clark, 2010) using data that come from the same longitudinal project with which I work in this research, but referring to older waves. The author does not analyze the influence of the dominant behavior in the network or the relevance of the density, but compares the effects of the best male friend's behavior and the behavior of another network partner, who is identified by the respondent as a male acquaintance or just friend, on the likelihood that the individual has been unfaithful. The analysis shows that the latter is not statistically significant when the model includes both factors plus other ones that are considered relevant in the literature. In my opinion, it is much more fruitful to explore the expectations about the group or social network as a whole rather than those about particular individuals, who have been selected by the researcher without enough justification. This alternative strategy makes use of valuable information about all network partners, so that the research can be related to prominent theoretical approaches about social networks and social norms that identify mechanisms of influence. In this study, I defend that the effect of the norm about fidelity/extramarital sex is channelled through perceptions about the dominant attitudes and behaviors in the social environment. Then, in order to relate this approach with the one in Clark's (2010), I also compare the effect of the best married friend's behavior with that of the proportion of unfaithful network partners (other than the best friend). Therefore, this study offers an improvement in the research on extramarital relations in Malawi, given that it updates and expands the quantitative research on the subject.

4.3. Data and measures

I use data from the most recent waves (2004 and 2006) of the longitudinal survey included in the *Malawi Diffusion and Ideational Change Project*. Only the married[4] men's reports are analyzed, in order to explore the factors that explain men's extramarital sexual behavior.

The dependent variable in the analysis measures whether the respondent has had extramarital sexual relations in the last year. In the questionnaires of both waves, a list of questions about the last three sexual partners during the previous 12 months is included. Those men who mention a sexual partner different from their wife or wives are classified as having had extramarital sex. In 2006, men are specifically asked if the partner was a previous wife. I check if a man who reports such a partner has had a marriage that finished in 2005 or 2006[5], in order to avoid considering as an extramarital affair a relationship with a woman with whom the man was married at that time. Those married men who report other sexual partners, but got married in the year when the survey was conducted, and were single until the last wedding in 2004 or 2006, respectively, are not considered as having had extramarital sex.[6] Steady girlfriend is the most frequently reported type of extramarital sexual partner in both survey waves, followed by infrequent partner. Table 4.1 shows the distribution of all the variables in the empirical analysis.

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[4] Married men also include those who are in consensual unions.

[5] I have decided to include the years 2005 and 2006 in the criterion because there is no information available about the month when the marriage ended and most interviews were carried out in mid-2006.

[6] This correction has been made in order to improve the measure, which is somewhat imperfect, since I do not know the exact dates when the weddings and sexual intercourse took place. It should be noted that the interviews for the two survey waves were carried out in mid-2004 and mid-2006, respectively.

Table 4.1. Characteristics of married male respondents: Percentages and descriptive statistics, Malawi 2004 and 2006

	2004	**2006**
Had extramarital sex		
No	88.0	89.6
Yes	11.0	9.4
Missing	1.1	1.0
Level of Education		
Never attended school	15.5	17.9
Primary	64.9	65.3
Secondary	13.9	16.8
Missing	5.7	0.0
Spending on personal purchases		
None	45.4	35.0
Some spending	29.6	38.6
In the quartile that spent the most	25.0	26.3
Missing	0.0	0.2
Religion		
Muslim	16.4	16.9
Catholic	22.6	25.0
Protestant	41.5	24.3
Others	19.6	33.2
Missing	0.0	0.6
Type of marriage		
Polygamous	16.0	15.4
Monogamous	80.0	83.4
Missing	4.0	1.2
Last time that attended church		
Last week	63.3	67.0
Last month	22.1	25.0
Previously to last month/Never	13.9	7.2
Missing	0.7	0.9

Table 4.1. (Continues)

	2004	2006
Stay outside the district		
During less than a month	85.1	80.8
During one month at least	14.7	13.1
Missing	0.2	6.0
Region		
South	34.6	33.9
Center	33.8	33.5
North	30.9	32.3
Missing	0.7	0.4
Proportion of unfaithful network partners		
No network partner	62.8	56.6
Less than half	12.4	18.8
Half or more	13.5	20.2
Without a network	10.2	1.8
Missing	1.2	2.6
Density		
Some net partners are not friends to one another	65.7	57.9
All net partners are friends to one another	17.4	38.8
Missing (all those with less than 2 net partners)	16.1	3.4
Age(mean)	40.8	40.7
S.D.	*(12.5)*	*(13.5)*
Missing	2.9	1.5
Known people that died from AIDS (mean)	7.8	9.0
S.D.	*(11.9)*	*(9.0)*
Missing	0.1	0.4
Duration of last current marriage (mean)	13.5	13.1
S.D.	*(10.1)*	*(10.7)*
Missing	3.7	4.1
N	1023	1127

Since extramarital sexual behavior is a sensitive topic, this indicator might be affected by misreporting. Sophisticated methods for dealing with this problem, as the one applied in

Chapter 6, cannot be used given that the man's report is the only available source of information about his extramarital relations. Nonetheless, the consistency between his responses to closely related questions has been analyzed. The respondent is asked at a different point in the questionnaire whether he has had a girlfriend or had sex with other partners during the time he has been married with his current wife. Since this question does not clarify if other wives can qualify as other partners, the test is restricted to men in monogamous marriages; Table 4.2 shows that a small percentage of those men who report not having had other sexual partners while married with their current spouse say that they have had extramarital sex in the last year according to the dependent variable in this study. That is the case in both waves, especially in 2006.

Table 4.2. Consistency in the responses about extramarital sex by monogamous married men

	Ever had extramarital sex during current marriage (2004)		
N=809	No	Yes	Sig
Had extramarital sex in last year (2004)			***
No	92.9	48.8	
Yes	7.1	51.2	
Total	100.0	100.0	
	Ever had extramarital sex during current marriage (2006)		
N=925	No	Yes	Sig
Had extramarital sex in last year (2006)			***
No	99.3	74.7	
Yes	0.7	25.3	
Total	100.0	100.0	

*** pvalue<0.01

The main explanatory variable according to the aim of this research study is the respondent's report about the extramarital sexual behavior of the people with whom he interacts. More specifically, the measure refers to the percentage of married network partners who have had sex in the last 12 months with partners outside marriage. It should be noted that this network is a proxy of the social network of reference, since it refers to those people, four at most, with whom the respondent has ever chatted about AIDS. I only take into account those that are married. In an alternative model, I also distinguish between the best male married friend's extramarital activity and the prevailing behavior among the rest of the network partners, with the intention of analyzing if the influence of others' behavior depends on the type of relationship that they have with the respondent. The dominant behavior in the network is measured with a three-category variable, in which the highest category includes those married men who say that 50% or more of their network partners, excluding the best friend, are unfaithful, and the lowest refers to those who report no unfaithful network partner. Models with an alternative categorization of this variable are also tested; these are commented on the empirical section below.

A different way to explore the relevance of the type of ties or relationships in the network is by introducing a measure of density. In this case, the variable differentiates between those men whose network partners are all connected by friendship links and the rest. The density indicator refers to the whole network – married and unmarried partners- in order to have a more accurate measure of the kind of social environment the respondent is immersed in. A very dense network is typical of a group in which very emotionally intense and frequent social interactions take place, and facilitates high levels of social pressure on its members.

The rest of the indicators in the analysis measure the individual and marital union characteristics that have been identified as relevant in the literature, although the magnitude and direction of their effects have not as yet been clarified for most of them.

As regards the respondent's age, the measure in 2004 has been constructed using information from several sources, given that only a fraction of the sample was asked about their age.[7] The age of the rest of men has been calculated from the information gathered in the following wave, 2006. If it is the case that they have not been interviewed in that wave, I calculate their age with the data from the previous wave, 2001, so that I can reduce as much as possible the number of missing cases. The same criterion has been applied to the construction of the education-level indicator. Previous research has found ambiguous evidence about the direction of the effect that this factor has on extramarital sexual behavior, since positive, negative, and even a non-significant effects have been estimated in different studies (Isiugo-Abanihe, 1994; Ahlburg *et al.*, 1997; O'Connor, 2001; Clark, 2010).

The respondent's economic status is measured with an indicator about the amount of spending on clothes, fabric for clothes, and shoes for himself in the past three months. The original variable is continuous and the unit of measure is kwacha – the official currency in Malawi. Given that a very substantial percentage of married men report no spending on these products (45% in 2004 and 35% in 2006), I have decided to construct a variable with three categories, in which the lower category includes the mentioned fraction and the higher one the highest quartile of the distribution of married men according to the amount they spent on these products. I consider that this is a good way of measuring the economic status, because it refers to the possession of cash, instead of goods or properties. Such a feature is interesting, since many studies have highlighted the role of monetary and nonmonetary transfers such as gifts in informal sexual relationships in sub-Saharan societies (Hunter, 2005; Mishra *et al.*, 2007; Bingenheimer, 2010). People expect that men

[7] Only the questionnaire that was administered to those men who accepted to take part on a study of biomarkers for HIV and other sexually transmitted diseases included this question.

must offer some economic support in exchange for sex, even in non-commercial relations. As such, those married men who have spent more on personal purchases are assumed to have more spending capacity, and so it is more likely that they can afford to have extramarital sexual partners.

The influence of religion has not shown a regular pattern in all countries (Isiugo-Abanihe, 1994; Kimuna and Djamba, 2005). In the case of Malawi, Clark (2010) even finds opposite effects depending on the wave she analyzes. The indicator used in this work synthesizes the different faiths in four categories: Muslim, Catholic, Protestant, and Others. The latter category, in addition to referring to African independent churches, involves men that answer 'no religion', who are 1.8% of the sample in 2004 and 0.9% in 2006. The respondent's religiosity is also taken into account with an indicator about the last time that he went to church. It distinguishes three types of men: those who attended last week, those who went during the last month, and those males who report that the last time they went to a church was as least two months ago. The latter category also includes those who never go to church.

The risk perception of getting infected with HIV also has to be taken into consideration. I expect that the epidemic has increased the costs of unfaithfulness, especially when the use of condoms is not widespread in sub-Saharan countries such as Malawi (Cleland and Ali, 2006; Bankole *et al.*, 2007; Chimbiri, 2007). Therefore, those men who are more aware of the disease, which is measured in this work with a continuous variable about the number of people known to the respondent that he thinks have died from AIDS, would avoid putting themselves at risk.[8] This indicator is more suitable than those that refer to individual evaluation of personal risk, because it is more clearly exogenous to the respondent's behavior.

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[8] In 2004, 3.2% of married men answered 'Don't know' to this question. I have imputed the average value of the distribution to these cases. The results of the empirical analysis barely change.

As regards the type of marriage, polygamous and monogamous marriages are differentiated, and the duration of the last marriage that is still continuing is included as well. The research about the influence of polygamous unions on extramarital sex is inconclusive (Isiugo-Abanihe, 1994; Carael *et al.*, 2001; Reniers and Tfaily, 2008). Some authors have claimed that the traditional institution of polygyny, considerably weakened by the spread of Christianity in Malawi as in other countries in the region (Kaler, 2001), might have generated or enforced the common belief that men need many sexual partners in order to be sexually satisfied (Caldwell and Caldwell, 1993). In spite of that, this convention could also have restricted the multiplicity of partners to the marriage domain (Mitsunaga *et al.*, 2005). Concerning the duration of marriage, it is expected that men who have lived longer with their wives are more willing to seek out for other sexual partners.

Labor migrants have usually been considered a crucial vector of the HIV spread among the heterosexual population, because they act as bridges between different sexual networks (Hirsch *et al.*, 2002; Wolffers *et al.*, 2002; Lurie *et al.*, 2003; Yang, 2006). In the case of sub-Saharan Africa, most of these migrants are rural men who temporarily stay in cities, far from the social control of their families and friends. The variable that I use identifies those married men who have stayed at least one month outside their district. I am aware, however, that migrant men might be underrepresented in the sample, so the conclusions that can be extracted on this issue from this analysis are limited.

The region of the country –north, center, and south- is also introduced in the model, due to the substantial differences in terms of cultural patterns (Helleringer and Kohler, 2005; Chimbiri, 2006), and the prevalence of extramarital sexual relations, the south being the region where more married men and women report having had other sexual partners.

Other factors that have been taken into account in some studies (Clark, 2010) are not included in this work. Having had a child who was born in the last year could be an interesting variable

because the practice of postpartum abstinence is believed to induce men to have extramarital sex (Glynn *et al.*, 2001a). However, the available information about children's date of birth is not accurate enough to construct a reliable measure.[9] Clark (2010) also attempts to observe if men have sex with prospective new brides, so she introduces an indicator that measures whether the man had a marriage that started the previous year. Nonetheless, I think that the introduction of this variable is not a good strategy, since it would imply considering such practice as extramarital sex even in those cases where the man was single at that point, and married at the moment of the interview. Even if I try to calculate whether the man was single anytime during the last year, which is very difficult because the information about dates of marriage does not specify the month, it is unlikely that men would report that relation as an extramarital affair.[10] Besides, this variable would be closely correlated with the type of union, since men in a polygamous marriage are more likely to have had extramarital sex in the previous year with a recent wife than a man who was single very recently and married to only one spouse.

4.4. Methods

The analysis is based on multivariate logistic regression models, given that I attempt to explain a dichotomous dependent

[9] In 2004, 5% of married men do not know the year in which their last child was born or the information is missing. In 2006, the date of birth of all the children who are not alive is not revealed, and 6% of men report having had children that died in the last year. Given the high infant mortality rate in Malawi, 69 per 1,000 live births (World Bank Indicators, 2009), it is not unlikely that many missing cases refer to very recent births.

[10] A respondent that is asked about his last sexual partners is unlikely to identify his current wife as two different sexual partners to be reported, even if she was his steady girlfriend when they had sex before marriage.

variable –having had sexual partners outside marriage in the last 12 months. First of all, the data from the two waves of the MDICP (2004 and 2006) are analyzed cross-sectionally. Thus, the model is:

$$\ln\left(\frac{p_i}{1-p_i}\right)=X_i\beta_1+N_i\beta_2+u_i$$

where p_i is the probability that a married man *i* has been unfaithful, *X* refers to the individual and marital union observed characteristics, *N* involves the social network characteristics, and u_i is the error term.

The cross-sectional analysis about the influence of social interactions on individual attitudes and behavior may be inadequate to estimate causal effects. The results from this analysis would be correct if all individuals have the same chance of interacting with any kind of person or network and do not select their communication partners according to particular characteristics that are related with the behavior that is intended to be explained. In the case of extramarital sex, it makes sense to think that those married men more prone to be unfaithful are also more likely to have unfaithful friends. A very clear example would be those men who usually go to brothels or similar places, since it is unlikely that they can remain friends with people convinced against extramarital sex. Thus, a significant correlation between the respondent's behavior and his network partners' activities could simply be a consequence of the active selection of interlocutors rather than evidence of a causal effect.

A solution that has been set out in many research studies about the role of interpersonal communication and social networks in personal attitudes and behavior is the use of longitudinal analysis with fixed-effects models. This method allows us to control for the unobserved heterogeneity among the respondents, which may affect the selection of social networks. Assuming that such heterogeneity is constant in time, the part of the error term that

refers to unobserved time-invariant characteristics is allowed to be correlated with the regressors. Obviously, a panel analysis requires having relevant information about the individuals obtained in more than one point in time. The model would be:

$$\ln\left(\frac{p_{it}}{1-p_{it}}\right)=X_{it}\beta_1+N_{it}\beta_2+\alpha_i+u_{it}$$

where α_i refers to the unobserved time-invariant characteristics, which are extracted from the error term. In the analysis with fixed effects, α_i might correlate with the network characteristics (N_{it}) and/or the explanatory variables (X_{it}), since α_i and all those observed variables that remain constant over time for each individual are extracted from the model.

However, the use of fixed-effects models with dichotomous dependent variables has an important limitation. The estimation procedure implies that only those individuals who change their behavior (the outcome) from one wave to the other are analyzed. As such, the sample size notably decreases most of time. For this reason, I use linear probability models, since the estimation of linear models with fixed effects does not imply a reduction in the number of analyzed cases (Behrman *et al.*, 2001). The model is then:

$$Y_{it}=X_{it}\beta_1+N_{it}\beta_2+\alpha_i+u_{it}$$

where Y_{it} is the expected probability of having had extramarital sex in the last 12 months.
In any case, both the linear probability and the logit models with fixed effects are presented for comparison. And, as we will see, the results barely change.

Alternatively, another statistical technique can be used to avoid the reduction of the sample size in the analysis of the effect that the social network has on individual behavior. Its major advantage in comparison to the fixed-effects model is that the

observed time-invariant variables can be included in the model and their effects estimated. This strategy is also an attempt to solve the selection problem of social networks. Given that it makes more sense that individuals tend to interact with people that have similar attitudes and characteristics, rather than the opposite, I am going to estimate the probability of married men changing their behavior when such behavior clearly contrasts with others' actions. This methodological approach may help to observe the individuals' tendency to act in accordance with the prevailing behavior in the group. While the dependent variable measures if there is a change between the behavior reported in 2004 and that referred to 2006, the explanatory variables are measured in 2004:

$$|\Delta y_i| = X_i \beta_1 + difN_i \beta_2 + u_i$$

where *difN* indicates whether the respondent behaves contrary to what his network partners do.

4.5. Empirical analysis

The multivariate analysis about the relevance of social interactions on having had an extramarital sexual partner in the last 12 months is performed through three different methods. A first approach consists of a cross-sectional analysis. I pool the data from the two waves, 2004 and 2006, so that a multivariate logistic analysis is applied to a larger sample. This method is considered suitable because it improves the statistical efficiency, given the greater number of cases, and there is no particular reason to think that the influence of each variable should substantially change from 2004 to 2006.

An alternative technique is used with the intention of taking advantage of the longitudinal character of the survey. I elaborate a panel study using fixed-effects analysis, so that I can deal with the difficulties derived from the nonrandom selection of network

partners, as I have explained in the methodology section. The third part of the analysis is also applied to married men who have been interviewed in the two waves with the purpose of explaining the change in extramarital sexual behavior, in any direction, from one point in time to the other.

As regards the cross-sectional study, Table 4.3 shows the results of the multivariate analysis of having had a sexual partner other than the wife, or wives in the case of men in a polygamous marriage. Specifically, the association I am most interested in is that between the individual perception about the network partners' sexual behavior outside marriage and the respondent's unfaithful activity. It must be noted that this network involves those people with whom the respondent reports having ever talked with about AIDS. Therefore, it is a proxy measure of the individual's social network. According to the explanations, based on preferences and expectations, about the mechanisms through which social norms affect a person's behavior, I expect that the proportion of married people in the network who have been unfaithful in the last 12 months has a positive effect on the probability that the respondent has had extramarital sex during the last year. In Model 1, it is assumed that the association between these two variables is lineal, while I test whether the effect is especially strong when contrasting the two extremes of the explanatory variable in Model 2.

Table 4.3. Multivariate logit models of husbands having extramarital sex in the last year, pooled data from 2004 and 2006, Malawi

	Model 1	**Model 2**
Age	-0.012	-0.012
	(0.009)	(0.010)
Education Level		
Never attended (ref)	-	-
Primary	0.310	0.338
	(0.234)	(0.234)
Secondary or more	0.252	0.327
	(0.321)	(0.321)
Spending in personal purchases		
None (ref)	-	-
Some spending	0.308	0.309
	(0.201)	(0.200)
In the quartile that spent the most	0.509**	0.525**
	(0.214)	(0.211)
Religion		
Muslim (ref)	-	-
Catholic	-0.261	-0.291
	(0.340)	(0.337)
Protestant	-0.338	-0.316
	(0.274)	(0.274)
Others	-0.564	-0.526
	(0.315)	(0.313)
Last time attended church		
Last week (ref)	-	-
Last month	0.081	0.078
	(0.200)	(0.198)
Previously to last month/Never	0.503*	0.491
	(0.294)	(0.298)
Known people died from AIDS	-0.022*	-0.023**
	(0.011)	(0.012)
Monogamous marriage	-0.857***	-0.841***
	(0.217)	(0.216)

Table 4.3. (Continues)

	Model 1	**Model 2**
Duration of last current marriage	0.001	0.001
	(0.011)	(0.011)
Stayed outside the District during one month at least	0.280	0.292
	(0.203)	(0.202)
Region		
South (ref)	-	-
Center	-0.495*	-0.510*
	(0.272)	(0.271)
North	-0.637**	-0.646**
	(0.277)	(0.277)
Proportion of net partners that had extramarital sex (cont)	1.843***	
	(0.241)	
Proportion of net partners that had extramarital sex		
No network partner (ref)	-	-
Less than half		0.482
		(0.225)
Half or more		1.346***
		(0.190)
Without a network	-0.444	-0.441
	(0.528)	(0.529)
Constant	-1.323***	-1.386***
	(0.481)	(0.494)
Observations	1822	1822

Clustered standard errors in parentheses

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

The continuous measure about the percentage of unfaithful network partners among those who are married has a remarkable effect on the dependent variable (Model 1). Model 2 shows that a categorical variable is a better measure, since those men with a network in which 50% or more of the individuals have had extramarital sex are especially more likely to be unfaithful than those who report communication networks where nobody has behaved in that way.[11] In other words, the likelihood of having extramarital sexual relations strongly depends on whether that sexual behavior is common or rare in the reference network. It could be interpreted that married men dare to be unfaithful when they believe that a notable percentage of the people with whom they talk about sensitive topics such as AIDS have extramarital affairs.

Concerning the relevance of the other variables in the model, Models 1 and 2 show that mainly four variables have a significant impact on the likelihood of having extramarital partners: economic status, risk perception, type of marriage, and the region. Being in the quartile of men that spend more money on clothes and shoes for themselves does substantively increase the likelihood of having extramarital sex in comparison with those who have not spent anything. The effect is not significant though, when comparing the rest of men with the reference category. Given that I have used this measure as a proxy of spending power and availability of cash, the result of this analysis is in line with the literature that emphasizes the role of monetary and nonmonetary

[11] A good alternative categorization of the proportion of unfaithful network partners restricts the highest category to those with networks in which more than half of the partners have had extramarital sex. The results in all the cross-sectional analyses are very similar to the ones shown in the tables. However, the higher category does not reach the significance threshold in the longitudinal model with fixed effects, although it is close to it. The lack of significance may be due to the very small size of that category (around 8% and 11% in 2004 and 2006, respectively).

transfers within sexual relationships –commercial and noncommercial ones (Luke, 2006; Tawfik and Watkins, 2007).

The extent to which men are aware of the negative consequences of risky sexual behavior is clearly a factor that needs to be taken into account when attempting to explain extramarital behavior. It makes sense to expect that a high level of perceived risk should discourage people from sexual intercourses outside marriage –especially if condoms are not used in them. I approach the individual perceived risk of getting infected with a continuous variable about the number of people the person knows who have presumably died from AIDS in the previous 12 months. The likelihood of having an extramarital sexual partner decreases as this continuous variable grows, according to Models 1 and 2.

The likelihood of having sexual partners outside marriage is notably higher when the man is married with more than one wife simultaneously. As I mentioned before, previous analyses on this matter show ambiguous results, so this study just offers some evidence that supports the positive influence of monogamy on the reduction of extramarital sex. In contrast, neither the duration of the last marriage that is still continuing nor having stayed outside their district for at least a month during the last year have a noticeable influence.

The region of the country where the man lives affects his sexual behavior. Those married men who live in the Center region and especially those who reside in the North region are less likely to have sexual relations outside marriage than married men from the South region. Such results are difficult to explain from a gender perspective. The system of marriage in the south is matrilineal, as I have already mentioned, which means that the wife's kinship is the one that owns the family resources and controls the offspring. These characteristics are supposed to provide the wife with more autonomy from her husband (Takyi and Broughton, 2006; Takyi and Gyimah, 2007), and to make it easier for her to divorce an unfaithful partner (Reniers, 2008). In addition, the residence system is matrilocal, so that the husband must move to live in the wife's village or household, which could

be interpreted as an increment in the control capacity of the wife's kinship over her husband's activities. It must be taken into consideration that women's extramarital sex also seems to be more common in the south than in the rest of the country (Reniers and Tfaily, 2008), so it could be argued that extramarital relations are more socially accepted, or at least less disapproved of, in this region. As a speculative exercise, the reason for the emergence of this norm could be related with the assumption that "humans strongly desire to successfully raise their biological children" (Mackie, 1996: 1007). Since females are certain of their maternity, unfaithful behavior by men or women is less problematic in contexts of matrilineal inheritance.

Unsurprisingly, the coefficient of the man's age is negative. However, it is not statistically significant. This variable is quite correlated with the duration of the last current marriage, which is included in the model as well. In fact, if the latter is extracted from Model 1, the man's age turns to reduce significantly the likelihood of having extramarital partners in Model 1. [12]

The level of education does not seem to be related with the dependent variable. As I have already mentioned in the section referred to the indicators construction, other studies show ambiguous results about the influence of the education level. So, this finding is coherent with previous investigations.

The coefficients of the religious affiliations are all negative, Muslim being the reference category, but only the residual category 'others' is statistically significant according to Table 4.3. Some authors have pointed out that the differences between faithful and unfaithful men are not related with professing a particular religion, but with the level of religiosity. That is, indeed, what Models 1 and 2 show, since those married men who report that the last time they went to a church was more than one month ago, or even never, are more likely to have had extramarital sex than those who attended church last week.

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[12] The results of this alternatively specified model are not shown here.

A relevant characteristic of a network is added in Table 4 –the density. It should be noted that in Models 3 and 4 the sample is also limited to those respondents who have talked to at least two people about AIDS, since the calculus of the density involves this requirement. The effect of the fact that all the network partners are linked to each other through friendship links is not significant in Model 3. Nevertheless, the introduction of density is interesting because it enables us to examine whether there is a multiplicative effect between this characteristic of the network and the proportion of unfaithful network partners –an issue that has not been explored before in the literature about the influence of the social environment on extramarital behavior. That is why I test Model 4, which shows that the effect of having a social network where half or more of the partners have extramarital affairs increases when, in addition, every network partner is connected to the rest through friendship links. The result in this wave is coherent with the argument that social pressure is more intense in close groups, where strong ties are very common and interactions are very frequent. Networks where everyone knows each other make it more costly to adopt behavior that contrasts with the most prevalent one. In the case of extramarital affairs, such scenario refers to contexts where this behavior is spread in the network and it is very likely that everybody knows that everyone knows that extramarital sex is normal. This means that it is 'common knowledge' (Chew, 1999).

A way of exploring whether the influence of others' extramarital sexual activity depends on the social pressure that they might exert –or on the closeness to the individual– is to distinguish between the best married male friend's behavior and that of the rest of married people in the network. This strategy of analysis is similar to the one followed by Clark (2010), although with one important difference. The author compares the effect of the best married male friend's behavior with that of the behavior of the first male network partner that is identified by the respondent as an acquaintance or just a friend. I have preferred to replace the latter variable with a measure about the dominant

extramarital behavior in the network. The reason why Clark selects this network partner instead of others is not fully explained. And, what is more important, influential theoretical explanations about the mechanisms through which social norms affect individuals' behavior emphasize the role of expectations about the population or group of reference as a whole, rather than about particular individuals (Bicchieri, 2006). However, this does not necessarily mean that all members of a group are equally important for the establishment and enforcement of a social norm. Some people, such as religious leaders, may play a key role. But the great part of their influence usually derives from the fact that individuals know that many people listen to them as well, so they can be consider a relevant source of information about what the others think should be done.

In Table 4.5, Model 5 includes an indicator that measures whether the respondent thinks that his best friend has been unfaithful, and another variable that refers to the proportion of the rest of the network partners who have had extramarital sexual partners. The two variables are crucial for understanding the respondent's behavior. The best friend's behavior has a stronger effect, but if half or more of the network (excluding the closest friend) has had extramarital sex, the likelihood of being unfaithful also increases independently of all the variables in the model.

Table 4.4. Multivariate logit models of husbands having extramarital sex in the last year, pooled data from 2004 and 2006, Malawi

	Model 3	**Model 4**
Age	-0.019*	-0.020*
	(0.010)	(0.010)
Education Level		
Never attended (ref)	-	-
Primary	0.303	0.315
	(0.238)	(0.244)
Secondary or more	0.411	0.380
	(0.329)	(0.331)
Spending in personal purchases		
None (ref)	-	-
Some spending	0.220	0.225
	(0.209)	(0.210)
In the quartile that spent the most	0.424*	0.420*
	(0.222)	(0.222)
Religion		
Muslim (ref)	-	-
Catholic	-0.274	-0.233
	(0.320)	(0.319)
Protestant	-0.298	-0.237
	(0.285)	(0.284)
Others	-0.442	-0.415
	(0.316)	(0.315)
Last time attended church		
Last week (ref)	-	-
Last month	0.017	-0.007
	(0.211)	(0.215)
Previously to last month/Never	0.534*	0.527*
	(0.302)	(0.299)
Known people died from AIDS	-0.024**	-0.024**
	(0.011)	(0.011)
Monogamous marriage	-0.959***	-.980***
	(0.224)	(0.227)

Table 4.4. (Continues)

	Model 3	**Model 4**
Duration of last current marriage	0.010	0.010
	(0.011)	(0.011)
Stayed outside the District during one month at least	0.278	0.277
	(0.209)	(0.208)
Region		
South (ref)	-	-
Center	-0.595**	-0.601**
	(0.274)	(0.271)
North	-0.683**	-0.702**
	(0.283)	(0.280)
Proportion of net partners that had extramarital sex		
No network partner (ref)	-	-
Less than half	0.526**	0.538**
	(0.230)	(0.260)
Half or more	1.346***	1.016***
	(0.200)	(0.246)
Dense network	0.247	-0.067
	(0.178)	(0.280)
*Dense network * Less than half had extramarital sex*		-0.098
		(0.522)
*Dense network * Half or more had extramarital sex*		0.891**
		(0.400)
Constant	-1.118**	-0.992
	(0.510)	(0.516)
Observations	1643	1643

Clustered standard errors in parentheses

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

Table 4.5. Multivariate logit model of husbands having extramarital sex in the last year, pooled data from 2004 and 2006, Malawi

	Model 5
Age	-0.011
	(0.010)
Education Level	
Never attended (ref)	-
Primary	0.241
	(0.235)
Secondary or more	0.244
	(0.319)
Spending in personal purchases	
None (ref)	-
Some spending	0.426**
	(0.204)
In the quartile that spent the most	0.576***
	(0.217)
Religion	
Muslim (ref)	-
Catholic	-0.273
	(0.333)
Protestant	-0.249
	(0.273)
Others	-0.550*
	(0.314)
Last time attended church	
Last week (ref)	-
Last month	0.051
	(0.204)
Previously to last month/Never	0.463
	(0.290)
Known people died from AIDS	-0.019*
	0.011
Monogamous marriage	-0.861***
	(0.214)

Table 4.5. (Continues)

	Model 5
Duration of last current marriage	0.004
	(0.011)
Stayed outside the District during one month at least	0.294
	(0.206)
Region	
South (ref)	-
Center	-0.546**
	(0.268)
North	-0.664**
	(0.273)
Best married friend's behavior	
No extramarital sex (ref)	-
Had extramarital sex	1.119***
	(0.182)
Proportion of net partners (except best friend) that had extramarital sex	
No network partner (ref)	-
Less than half	0.140
	(0.243)
Half or more	0.699***
	(0.197)
Without a network	-0.051
	(0.388)
Constant	-1.551***
	(0.502)
Observations	1805

Clustered standard errors in parentheses
*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

This result conflicts with the cross-sectional analysis in Clark's work (2010), where the data from two previous waves –

1998 and 2001- of the MDICP are used. As mentioned above, Clark includes a similar indicator about the best friend's behavior and a measure that refers to the first married male acquaintance or just friend mentioned by the respondent. In that research, only the best friend's extramarital activity has a significant effect on the individual's behavior. My analysis, however, offers the opportunity to examine the relevance of the prevailing behavior in the network or group of reference, instead of particular individuals' actions.

As I have already explained in the methodology section, the investigation about the influence of social interactions on individual's opinion, attitudes, and behavior is hindered by potential network selection problems. This term mainly refers to the fact that the estimation of the effects may be biased because most techniques force us to assume that social networks are randomly distributed. This means that every individual has the same chance to have any type of networks, which is usually an unrealistic assumption. As regards the specific topic in this research, in a situation where men who are more likely to be unfaithful are also more prone to interact with other unfaithful people, the estimation process could not disentangle the effect of the social relationship from the differential tendency to have extramarital affairs.

A longitudinal analysis using a fixed-effects model is elaborated with the intention of solving the network selection problem. This technique allows some unobserved and constant characteristics to be correlated with the explanatory variables, because the estimation process conditions out the time-invariant part of the model. As such, the estimation is not biased even when men tend to interact with people who have similar attitudes, opinions, and behavior. The fact that certain geographic and social conditions make it easier for some individuals and difficult for others to have social interactions would not be problematic either, as far as we can be more or less confident that those characteristics do not vary from one point in time to the other.

The time-invariant variables are excluded from all the models in Table 4.6, so that the effects of the level of education, religion, and region are not estimated.[13] Each specified model is estimated as a linear probability model (LPM) and as a logit model for comparison. The sample size in the longitudinal analysis (Table 4.6) is reduced to those married men who have been interviewed in both waves: 2004 and 2006. Moreover, those men whose extramarital sexual behavior has not changed from one point to the other are eliminated from the logit model.

The measure about the network's behavior in Model 6 is the same as that in Model 2: a categorical variable that classifies according to the percentage of married network partners, including the best friend, who have been unfaithful. In both the linear probability model and the logit model, those individuals who have a network where 50% or more of the partners have had extramarital sex are significantly more likely to end up having extramarital partners than those who report that no married person in their networks has had sex outside marriage. It should be noted that the coefficients in the panel analysis refer to the influence over the likelihood of change in the dependent variable. The longitudinal analysis corroborates the result of the cross-sectional test and offers evidence that supports a causal effect of the proportion of unfaithful network partners on the individual's behavior. The analysis is consistent with the idea that expectations about the prevailing behavior in the group influence individual behavior, so that people tend to adapt their actions to what they think is socially accepted, or at least not rejected. On the other hand, the only explanatory variable that has a significant effect is spending on personal purchases. The year dummy also has a significant coefficient.

[13] I introduce a dummy of the wave, so the man's age in not included since both variables measure the same thing. This is so because the fixed-effects model estimates the within individual variation.

Table 4.6. Panel analysis (linear probability models and logit models) with fixed effects of husbands having extramarital sex in the last year, waves 2004 and 2006, Malawi

	Model 6		**Model 7**	
	LPM	**Logit**	**LPM**	**Logit**
Spending in personal purchases				
None (ref)	-	-	-	-
Some spending	0.035*	0.939**	0.039*	0.801**
	(0.019)	(0.424)	(0.020)	(0.407)
In the quartile that spent the most	0.012	-0.106	0.01	-0.266
	(0.039)	(0.660)	(0.040)	(0.660)
Last time attended church				
Last week (ref)	-	-	-	-
Last month	0.008	0.467	0.006	0.233
	(0.029)	(0.551)	(0.030)	(0.514)
Previously to last month/Never	0.035	0.697	0.03	0.731
	(0.048)	(0.830)	(0.050)	(0.810)
Known people died from AIDS	0.000	0.037	0.000	0.044
	(0.001)	(0.048)	(0.001)	(0.047)
Monogamous marriage	-0.045	-1.418	-0.040	-0.977
	(0.067)	(1.525)	(0.069)	(1.224)
Duration of last current marriage	0.001	0.077	0.001	0.044
	(0.003)	(0.064)	(0.003)	(0.057)
Stayed outside the District during one month at least	0.013	0.078	0.016	0.278
	(0.038)	(0.854)	(0.039)	(0.786)
Best married friend's behavior				
No extramarital sex (ref)			-	-
Had extramarital sex			0.011	-0.029
			(0.033)	(0.440)

Table 4.6. (Continues)

	Model 6		Model 7	
	LPM	**Logit**	**LPM**	**Logit**
Proportion of net partners that had extramarital sex[1]				
No network partner (ref)	-	-	-	-
Less than half	-0.022	-0.335	-0.009	-0.211
	(0.033)	(0.596)	(0.039)	(0.717)
Half or more	0.076**	1.202*	0.035	0.513
	(0.036)	(0.685)	(0.039)	(0.596)
Without a network	-0.021	-1.242	0.020	0.184
	(0.052)	(1.256)	(0.048)	(1.034)
Year	-0.025**	-0.624**	-0.024**	-0.561**
	(0.011)	(0.264)	(0.011)	(0.252)
Observations	1119	138	1106	138

Standard errors in parentheses

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

[1] The network does not include the best friend in model 7.

In Model 7 (Table 4.6) a distinction is made between the best friend's behavior and that of the rest of the network partners. The analysis indicates that none of the variables that refer to the social environment significantly affect the dependent variable. It could be that the selection problem is very serious in the case of the best friend, since a person tends to more actively select their closest friends than other people to whom she relates. That would explain why the effect of the best friend's behavior that was observed in the cross-sectional analysis is no longer significant anymore when the time-invariant characteristics are controlled for in the longitudinal study. However, it is not clear why the prevailing behavior in the network is significant in Model 6 but not in Model 7 –especially because the problem derived from the non-random selection of interlocutors should be more intense when the best

friend is included, as happens in the variable in Model 6. The lack of significance is not due to collinearity because the best friend's behavior and the prevailing behavior in the network are only slightly correlated. It could be that variation in the absolute number of network partners is affecting the results. In Model 7 the category 'without a network' also includes those men that only have one network partner and such a partner is their best married friend, since the best married friend's behavior is extracted from the social network variable and constitutes a different explanatory variable.

An alternative model is added that may help to deal with some of the limitations that the fixed-effects model and the cross-sectional analysis involve. I am especially concerned about the tendency to select as friends people with similar characteristics, but I would not like to miss the chance to estimate the effect of the time-invariant explanatory variables. Therefore, I use a logistic model of change in the dependent variable to estimate whether behaving in a contradictory way to the prevailing behavior in the network or to the best friend's actions induces married men to alter their extramarital sexual behavior (Table 4.7). All the variables in the model are measured in 2004, except the dependent variable that differentiates between those who have changed their behavior from 2004 to 2006 and those who have not. According to Model 8, the likelihood of changing –in one or the other direction- increases when the best friend's behavior and especially the network's prevailing behavior are the opposite to that of the respondent in the first wave. In other words, the men who have a social environment, made up by the best friend or a group of people with whom they interact, in which the dominant extramarital behavior is different to his are more likely to change their conduct than those who act in accordance with the people around them. Therefore, the results suggest that married men tend to coordinate their actions –even extramarital sexual ones. More specifically, men are prone to behave as they think their best friends and, above all, the bulk of their social network partners do. So, expectations about others' behavior seem to be crucial for

understanding the likelihood of having other sexual partners outside marriage. The interpretation of the rest of the coefficients is complicated, since they refer to the effect on the change, independent on the direction.

Table 4.7. Multivariate logit model of change in husbands' extramarital behavior between 2004 and 2006, Malawi

	Model 8
Age	0.013
	(0.016)
Education Level	
Never attended (ref)	-
Primary	-0.288
	(0.391)
Secondary or more	0.289
	(0.530)
Spending in personal purchases	
None (ref)	-
Some spending	0.224
	(0.346)
In the quartile that spent the most	0.815**
	(0.353)
Religion	
Muslim (ref)	-
Catholic	-0.118
	(0.557)
Protestant	-0.213
	(0.521)
Others	-0.393
	(0.583)
Last time attended church	
Last week (ref)	-
Last month	-0.038
	(0.353)
Previously to last month/Never	0.316
	(0.409)

Table 4.7. (Continues)

	Model 8
Known people died from AIDS	-0.030
	(0.022)
Monogamous marriage	-1.239***
	(0.406)
Duration of last current marriage	-0.041*
	(0.022)
Stayed outside the District during one month at least	0.136
	(0.396)
Region	
South (ref)	-
Center	0.127
	(0.487)
North	-0.091
	(0.527)
Best married friend's behavior	
Similar to the respondent's (ref)	-
Different than the repondent's	0.987***
	(0.298)
Prevalent behavior in the network[1]	
Similar to the respondent's (ref)	-
Different than the repondent's	2.495***
	(0.350)
Without a network	0.321
	(0.469)
Constant	-1.548*
	(0.816)
Observations	545

Standard errors in parentheses

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

[1] The network does not include the best friend.

4.6. Conclusion

The study of the factors that promote or discourage extramarital sex is crucial for understanding the spread of the HIV epidemic in sub-Saharan Africa. Moreover, it may offer theoretical and empirical grounds that could be used to identify the best strategies for prevention campaigns. This research has focused on the analysis of the influence that the behavior of the people with whom a man interacts has on his own extramarital behavior. The units of analysis are married men from rural Malawi, a country with a high rate of HIV prevalence that shares many social and economic characteristics with the rest of the countries in the region most devastated by the epidemic, the African Southeast (World Bank, 2006).

The proportion of married people in the respondent's network that have had, according to the respondent, some sexual partners other than their spouses in the last 12 months positively influences the likelihood of a married man being unfaithful. Consistent evidence about the relevance of individual expectations about others' behavior has been found through the three analytical strategies used in this research. In addition, a special effort has been made to examine the causal relationship between such expectations and the dependent variable, trying to avoid wrong estimations of the effect derived from the active selection of interlocutors by the respondents. Thus, the results support the hypothesis that married men in Malawi take into account the prevailing extramarital behavior in their social network when deciding about their own behavior. In terms of some relevant theories about social norms (Bicchieri, 2006), the empirical expectations matter. That is to say, beliefs about the extent to which this sexual practice is widespread in the population of reference affects a man's decision of adopting it or not.

Despite the fact that marital infidelity does not seem to be normally accepted, since a very small percentage of the sample agrees with the statement that such practice is acceptable, individuals update their beliefs about the legitimacy of the norm

and the costs of contradicting it. These two aspects are related, in turn, to the type of social network, so that the densest networks, typical of small and homogenous groups that foster intense relationships, tend to facilitate social pressure and control (Granovetter, 1973). Moreover, density does not only inform us about the capacity of effectively watching and punishing, but it also makes coordination possible through *common knowledge* (Chwe, 1999). In other words, it is not only important to know what others do, but also to know that each of the others knows that the rest know what the others do. In the case of sexual unfaithfulness, the decision about having extramarital affairs or not depends on whether the man knows that the information he knows about the prevalence of this practice in the group is shared by all the members. An interaction has been included in the model in order to test the hypothesis that density intensifies the effect of the empirical expectations. The analysis supports the hypothesis.

An alternative approach relies on examining whether the influence of others' behavior depends on the type of links with the individual. Clark (2010) introduces in her model the activities of both the best friend and that of a man who is considered to be just an acquaintance or a friend by the respondent. Here, I substitute the latter by the prevalent extramarital behavior in the network, made up of married men excluding the best friend. This enables us to explore whether the crucial factor for understanding the respondent's actions is the behavior of particular people closely linked to the individual or that of the network as a whole, independently of the degree of intimacy. The cross-sectional analysis shows that both factors are relevant, but the association with the best friend's behavior is stronger. However, no significant effect is found from either variable in the longitudinal analysis with fixed effects. However, the analysis of the likelihood of change of behavior from one wave to the other indicates that having a best friend and, above all, having a network that acts contrary to the respondent in 2004 increase the likelihood of reporting a change in extramarital activity in 2006.

In sum, the results of this research show that individual behavior is affected by the expectations about what others do, even in such a private field as extramarital sex. If this finding is interpreted as evidence that the degree of social acceptance or tolerance of infidelity is crucial for understanding individual behavior, then the analysis let me add that the relevant information for the individual to evaluate the strength of the norm that regulates extramarital behavior is the proportion of unfaithful network partners rather than the activities of particular people that are closely related to the individual. However, the role of the prevalence of extramarital sex in the social environment as a signal of the power of the fidelity norm is reinforced when the ties among the members of the network are strong, that is when all the people around are closely related to each other.

CHAPTER 5. PROTECTION OR CONTRACEPTION? DEALING WITH THE TWOFOLD FUNCTION OF CONDOM USE

In the previous chapter, it has been shown that men's expectations about the level of compliance with the norm of fidelity in their social networks influence their own extramarital sexual activity. Such norm is also expected to have some impact on the adoption of another practice related with the transmission of HIV: the use of condoms within marriage. Chapter 6 will deal with the test of this hypothesis. In the present chapter, I am focusing on identifying the factors that may promote positive individual attitudes towards the use of condoms in marital relationships. Specifically, the aim is to examine whether acceptance of each of the two functions of condom use, protection and contraception, in the social network affects married men's and women's attitude towards suggesting the use of this device to their spouses.

5.1. Introduction

The main task of this chapter is to explore the type of messages received through interpersonal communication that induce positive attitudes towards condom use in marital relations in rural sub-Saharan Africa. The twofold function of condom use – contraception and STD protection- should be taken into account

when understanding attitudes towards its use. Emphasis on the interpretation of condom use as a protective practice conflicts with the grounds of marriage. Crucial social norms that regulate marital unions refer to fidelity and trust (Watkins, 2004; Smith and Watkins, 2005; Chimbiri, 2007; Tavory and Swidler, 2009). To suggest condom use to the spouse is likely to be very costly when the couple lives in a social context where condoms are considered a barrier against HIV infection and, at the same time, where unfaithfulness is socially disapproved of (Blecher et. al, 1995; Muhwava, 2004). Such a suggestion would be interpreted as either an admission that one has been unfaithful or that one believes the other has. In any case, the couple would face a serious problem of distrust. The association of condom use exclusively with protection from infection is thus self-defeating because to propose its use necessitates the breaking of one of the norms of marriage.

However, the alternative interpretation of condom use as a contraceptive method may be less problematic, since the acceptance of family planning has dramatically increased. It is obvious that such an interpretation would not solve the whole problem of the high rates of infection in serodiscordant couples (Dunkle *et al.*, 2008), since condom use would only take place in older couples that want to stop having children or in couples that want to space births. Nonetheless, it could facilitate the negotiation of condom use in marital sex –which would reduce the likelihood of infection- and also in other sexual contexts such as long-term extramarital relations.

The individual interpretation of condom use is thought to be strongly dependent on the prevailing meaning of condom use in the society and the social approval of family planning and condom use. In this work it is explored whether the personal attitude towards condom use within marriage is affected by the dominant attitude and behavior in the respondent's social network. More specifically, the study is designed to examine whether social acceptance of condom use as an HIV-preventive practice has no substantial effect, whereas the social approval of modern contraception, and specifically the use of condoms for that

purpose, induces positive attitudes towards this practice within marriage.

Married men and women in rural populations of Kenya and Malawi are the units of analysis in this research. Both countries could be considered quite representative of the Southeastern African region in terms of several socioeconomic indicators and HIV prevalence rates (World Development Indicators, 2008). The aim is not to offer a proper comparative study of the phenomenon in the two countries, but to explore if the expected causal relations are observed in two typical countries of the region.

This chapter is divided into six sections. In section 5.2, the reasons why an interpretation of condom use, related to one of its functions, has been spread among the population at the expense of an alternative one are explained. The consequences for levels of condom use within marriage are also identified. The theoretical grounds and the hypotheses are set out in section 5.3. The data used and the statistical methods applied in this chapter are described in section 5.4. The section 5.5, where the results are shown and commented, is divided into two subsections. The analysis of the Kenya data is presented in the first one, while the second subsection refers to the Malawi analysis. Finally, the section 5.6 deals with the concluding remarks and the discussion.

5.2. The twofold function of condom use

A condom is both a barrier contraceptive method and a protective device against sexually transmitted diseases (STD's) and HIV. As regards contraception, condoms are not so effective as non-barrier methods such as sterilization, pills, and injectables, although the estimated effectiveness for preventing pregnancy is 87% when couples made a typical or imperfect use of this device (Trussell *et al.*, 2009). Regarding protection, condom use is considered the most effective device against HIV infection through sexual contact, with an estimated reduction in risk of more than 80% (Davis and Weller, 1999; Holmes *et al.*, 2004).

5.2.1. Family planning and HIV-prevention programs

Given these two functions of condoms, their use has been promoted through programs with different kinds of purposes in sub-Saharan Africa. Before the HIV/AIDS epidemic took place, there was already promotion of family planning, including condoms, in this region. In the late 60's such promotion was mainly carried out by foreign agencies in many countries like Malawi (Chimbiri, 2007); and Kenya was the first African country to adopt a Family Planning Program (1967) and a National Population Policy (1984) (Aloo-Obunga, 2003). However, highly effective contraceptive methods were promoted much more than less-effective barrier methods (Ali *et al.*, 2004).

On the other hand, HIV-prevention programs, public and private, that have been carried out in sub-Saharan African countries have emphasized the preventive function of condom use (Maharaj, 2001). Actually, the 'ABC' approach, which has been strongly defended by NGOs, governments, and donor agencies, considers condom use one of the three central preventive practices to be promoted –A stands for abstinence, B for be faithful and C for condom use. However, the three practices have not received the same attention. In fact, it could be said that the letters are put not only in alphabetic order but also according to their relevance for the agencies. The US government, the largest international funder of HIV/AIDS programs, did have a clear preference for the abstinence promotion during the Bush administration (Sinding, 2005; Cleland and Ali, 2006). But what is more important, most programs have encouraged condom use as a suitable preventive method in casual and commercial sex. Following the logic applied in other regions of the world, where condoms have been promoted among certain high risk groups in which the HIV/AIDS epidemic is concentrated, such as sex workers and men who have sex with men (UNAIDS and WHO, 2007), HIV preventive programs may have helped to diffuse the association between condom use and risky sexual contexts. In sub-Saharan Africa, where the main source of HIV infection is through heterosexual contact (UNAIDS

and WHO, 2009), such risky contexts are basically commercial sexual exchange and sexual relations outside or before marriage.

Two more features of the programs that have helped to spread the interpretation of condom use as a protective device against infection should be mentioned. First of all, since the HIV/AIDS pandemic became a public health problem of first order, HIV programs have been prioritized at the expense of Family Planning programs (Aloo-Obunga, 2003; Mekonnen *et al.*, 2004). Thus, the meaning of condom use that sub-Saharan people have mostly received from public and private programs during the last two decades at least is its HIV protective function. Secondly, it has been very common in the region that these two types of programs (for Family Planning and for HIV/AIDS prevention) have not worked as closely as they should have (Family Health International, 2004). Those not-so-common programs designed to diffuse the integration of STD prevention and family planning (Askew and Baker Maggwa, 2002) have usually promoted dual protection (use of non-barrier methods and condoms simultaneously). Such strategy may reinforce the idea that condoms are only suitable for STD prevention rather than pregnancy avoidance. In fact, dual protection in marital sex has been found to be difficult to accept by both men and women (Maharaj, 2001; Morroni *et al.*, 2003).

5.2.2. The meaning of condom use

All the mentioned issues of the family planning and HIV programs seem to have contributed to the widespread idea among the population that condom use is related to 'illicit' sex and infidelity. Such an idea is reflected in the great differences in levels of condom use depending on the type of partner. Numerous studies about sub-Saharan countries –as well as other regions (Macaluso *et al.*, 2000; de Visser *et al.*, 2003)– have shown that the highest prevalence of condom use takes place in commercial sex, while the lowest levels are observed in regular or marital

relationships (Norman, 2003; Ferguson *et al.*, 2004; Westercamp *et al.*, 2010; de Walque and Kline, 2011). Moreover, condom use tends to decrease as the duration of the relationship increases (Westercamp *et al.*, 2010). Thus, condom use within marriage is still a rare phenomenon –in Kenya and Malawi, the countries under study in this research, the percentages of men who say they used a condom the last time they had sex with a spouse or cohabiting partner are 3.4 and 6.9, respectively.[1] These figures are smaller when women's reports are considered.

Emphasis on the preventive function of condom use is incompatible with two of the main norms that regulate marital relations: trust and fidelity. Several qualitative studies have shown that sub-Saharan people tend to agree that condoms should be used with partners who cannot be trusted –because they might be "promiscuous" (Chimbiri, 2007; Smith, 2007; Tavory and Swidler, 2009). As such, the suggestion of condom use signals that either oneself should not be trusted or that the partner is not trustworthy (Blecher *et al.*, 1995; Varga, 1997). Both of these interpretations are in conflict with the expected behavior of spouses. Since a marital relationship is supposed to be based on an important level of trust between the spouses, the proposal of condom use brings out the weakness of the relationship base. The results of this action have been identified in some studies, which show that the suggestion of using condoms to the spouse may result in very bad consequences such as divorce and physical abuse (Muhwava, 2004; Versteeg and Murray, 2008; Achan *et al.*, 2009).

Infidelity is not normatively supported in these countries, although extramarital relations are not a rare phenomenon[2]. Married people, especially women, are expected to be sexually

[1] Source of information: Kenya DHS 2003 and Malawi DHS 2004.

[2] According to the most recent DHS, the percentage of men who report having had some extramarital sexual partners in the previous 12 months is about 10% in Malawi (2004) and Kenya (2003) and around 20% in other countries of the region such as Tanzania (2004/05), Uganda (2006), Mozambique (2003), Namibia (2000) and Zambia (2001/02).

faithful, since that is understood as the way a spouse ought to behave (Akwara *et al.*, 2003). Around 80% percent of married men in rural Kenya report that it is acceptable for a wife to divorce an unfaithful husband (KDICP 1999), and only 7% of married men in rural Malawi agree that it is acceptable for a married man to have sexual relations outside marriage (MDICP 2004). In addition, public condemnation of sexual unfaithfulness by the numerous churches that are established in these countries (Garner, 2000; Agadjanian, 2005; Parsitau, 2009; Clark, 2010), together with the serious threat of the HIV epidemic in people's daily lives, is enforcing the normative disapproval of extramarital sex.

But, unfortunately, the connection between condoms and infidelity is not the only obstacle for the use of this device. Several qualitative studies have observed that individuals complain of the reduction in sexual pleasure that condoms involved (Bauni & Jarabi, 2000; Hunter, 2002; Dilger, 2003; Thomsen *et al.*, 2004). Even fears of side effects and health risks believed to be caused by condom use are quite extended (Maharaj, 2001; Tavory & Swidler, 2009). Nonetheless, it makes sense to think that the promotion of condom use as a basically efficient contraceptive method should be more helpful for increasing the acceptability of this practice in formal relations.

5.2.3. Benefits of condom use within marriage

At this point, it is necessary to pose the following question: Is the low level of condom use within marriage something that we should care about? Several studies of different sub-Saharan countries have found that most new HIV infections take place in serodiscordant married or cohabiting couples (Dunkle *et al.*, 2008; Gelmon *et al.*, 2009; Khobotlo *et al.*, 2009; Mngadi *et al.*, 2009; Wabwire-Mangen *et al.*, 2009). On the other hand, men are more likely to bring HIV infection into a concordant-negative partnership (Hugonnet *et al.*, 2002). Getting married does not work as a preventive strategy against HIV infection, since the

percentage of women who are infected is much higher among married females than among single ones of the same age (Glynn *et al.*, 2001b; Kelly *et al.*, 2003). Moreover, the probability of HIV transmission per coital act is very low (Quinn *et al.*, 2000; Gray *et al.*, 2001), so the HIV-negative partner in a discordant couple is not automatically infected rapidly.

Therefore, it seems clear that preventive behavior within marriage is crucial for the reduction of HIV incidence in the sub-Saharan region. But, is condom use a suitable practice for married couples to prevent infection and avoid unwanted pregnancies? As mentioned above, the effectiveness of the correct and consistent use of condoms for reducing the spread of STD's and HIV in the population has been proved (Holmes *et al.*, 2004). However, this high protective effect at the individual level has not been observed when women and men make intermittent use of condoms (Detels *et al.*, 1990; Kiddugavu *et al.*, 2003). And the problem is that, as Ali, Cleland and Shah show in their study of 16 developing countries (2004), condom users are more likely to experience discontinuation in their contraceptive use than pill users. However, the main reason for their interruptions is the switch to another contraceptive method, usually a more effective one. Consistent condom use would increase, then, if couples became aware that the gains in terms of contraception and sexual health are not substantially reduced when using condoms instead of other modern methods. The percentage of women experiencing an unintended pregnancy during the first year of a correct use is 0.3 and 2 in the cases of pills and condoms, respectively (Trussell *et al.*, 2009). Even when there is a clear difference, the condom efficacy is still very high, and its unique benefits in protection from STDs should make this device more valuable. In fact, Ali *et al.* (2004) show that the negative reproductive consequences, in terms of abortion and unwanted births, of a radical shift from contraceptive pills to condom use in the population would be minor, according to their study. As regards the consequences for HIV prevention, the authors affirm that "at the population level, it is indisputable that condom use, albeit imperfect, can make a huge

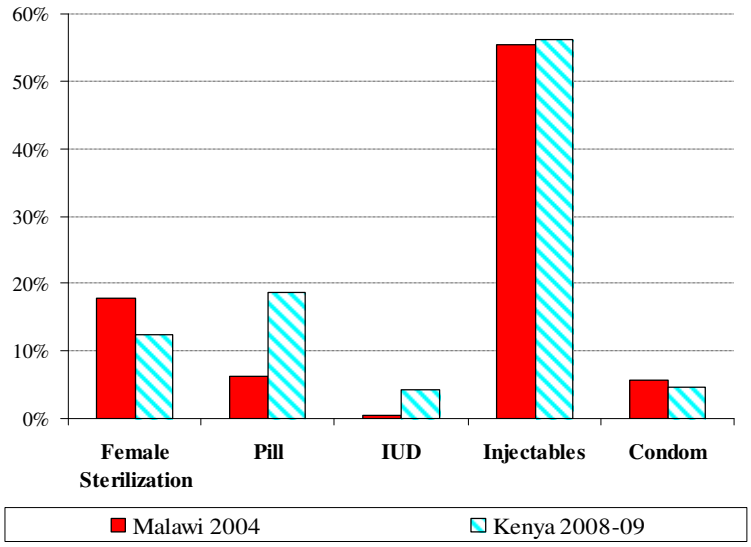
contribution to the containment of HIV epidemics" (Ali *et al.*, 2004). Actually, the authors defend, not only in this piece of research (Maharaj and Cleland, 2004; Cleland and Ali, 2006), a modification in the HIV preventive programs strategies in favor of the promotion of condom use within marriage.

Once that we are aware of the potential benefits for the containment of the HIV epidemic and the low costs in reproductive health terms that the generalization of the use of condoms in marriage may have, it is time for thinking about the best way to promote it. In line with what has been said above, and agreeing with what other scientists have stated (Ali *et al.*, 2004), the promotion of condom use as a contraceptive method with an implicit recognition of its protective function would make an important contribution. Although diffusion of modern contraception in the developing world was expected to take ages and need enormous efforts in order to modify social attitudes, reproductive desires, and sexual behavior, the use of these methods has risen dramatically during the last decades (Bongaarts *et al.*, 1990). Africa is the region where the increase in family planning has been more moderate, but with important variation between countries. The highest levels of contraception use are observed in the East and South of the continent, where HIV prevalence is highest (Cleland and Ali, 2006). Kenya's modern contraceptive prevalence rate has amounted to 28% and 45% among all women in reproductive ages and currently married women, respectively (KDHS 2008/09). Analogous figures for Malawi are 22% and 28% (MDHS 2004).[3] Therefore, modern contraception (any method) within marriage is much more accepted and practiced than condom use with a spouse. Given the notable effectiveness of condom use as a contraceptive method, women and men who are willing to make use of modern contraception could learn that this device can help them to fulfill the desires of birth stopping and birth spacing. However, it cannot

[3] KDHS and MDHS stand for Kenya and Malawi Demographic and Health Surveys.

be denied that a switch from non-barrier methods to condom use is especially difficult in contexts in which injectables are the most used contraceptive method among married women, as it is the case in Kenya and Malawi (Figure 5.1). Injections are usually given monthly or every three months, and involved a medicalized view of contraception. Thus, such a switch would force women or couples needed to take active control of their reproductive issues.

Figure 5.1. Current use of specific contraceptive methods among currently married women who use modern contraception, Malawi 2004 and Kenya 2008-09



Source: Demographic and Health Surveys, Malawi 2004 and Kenya 2008-09.

5.3. Making (or not) certain norms salient

The effect of social interactions has been theorized to be especially relevant in contexts where a social or environmental

change has generated a high level of uncertainty about the best and most proper behavior for facing the new situation. Research studies on collective action (Schelling, 1971; 1978; Granovetter, 1973; 1978) and on the diffusion of innovations (Rogers, 1995) have emphasized the importance of social interactions. Of particular relevance for the aims of this research are the analyses of the process through which social networks influence attitudes and behavior related to family planning, reproduction, and HIV/AIDS prevention (Entwisle *et al.*, 1996; Montgomery and Casterline, 1996; Kohler *et al.*, 2001; Smith and Watkins, 2005; Kohler *et al.*, 2007). In this study, I am interested in exploring the influence of social interactions on individuals' attitudes towards condom use within marriage. This work contributes to this field of research by linking the literature on social learning and social influence processes to recently redefined theoretical explanations about the mechanisms through which social norms modify people's choices.

5.3.1. Theoretical grounds

In order to understand the effect that social interactions may have on the meaning of condom use and its compatibility with norms that regulate behavior, it is important to explain the mechanism through which individuals tend to conform to social norms. Bicchieri's framework (2006) about the heuristic route to behavior, which has its bases on psychological explanations of decision taking process, can shed light on this matter. Bicchieri offers a constructivist theory of social norms, which means that they are explained in terms of preferences and expectations. Her approach is coherent with the rational choice perspective since it evaluates whether an action is rational, in the sense that it takes into account its consistency with the actor's preferences and expectations.

However, the author moves away from the traditional rational choice model in some way, since she does not defend a

deliberational route to behavior. According to the rational choice theory, actors are supposed to consciously evaluate the results of different actions and choose the one that provides them the highest expected utility. This implies that every decision needs a notable amount of effort, time, and resources. Nonetheless, cognitive social psychology has provided solid experimental evidence that supports dual-process approaches, that is to say, theories arguing that human beings can use two modes of information processing (Fazio, 1990; Chaiken and Trope, 1999). A systematic evaluation of the consequences of each action given its costs and benefits is one of these modes. Individuals are likely to follow this way to reach a decision when they are sufficiently motivated, that is, when the consequences of the action are very important or the situation has a special personal value. Otherwise, we tend to initiate a more rapid and less conscious process of decision making; we usually follow behavioral rules, such as norms, roles, or habits (Bicchieri, 2006: 4). The heuristic route to behavior, in contrast with the deliberational one, is based on a mental process that uses cognitive shortcuts to categorize each situation through a search for cues about how to interpret it and the suitable way to behave. When facing a new situation, our minds compare it with others that have similar characteristics, or in other words, they categorize it. Such a process enables us to assign a meaning to the situation, which clearly affects an individual's behavior (Kay *et al.*, 2004; Liberman *et al.*, 2004). The interpretation of the context leads us to identify the behavioral rules that prescribe a particular course of action in a particular situation. Norms are one sort of behavioral rule that is activated by contextual stimuli (Vanberg, 2002). This process usually takes place automatically, and we become aware of the beliefs and intentions that support our actions only when they are challenged.

In sum, the reason why a specific norm is followed instead of another one in a particular situation lies in the crucial process of priming. A norm needs to be salient is order to be identified and followed. And the mechanism that makes the priming effect possible is the mental process through which the situation we face

is 'located' in a category of contexts, and a particular behavior that is appropriate for it is identified.

Economists are recently recognizing not only the relevance of social norms on human behavior, but also the importance of the ways in which the cognitive process is altered. Thaler and Sunstein (2008) argue that individual decisions may depend on things other than preferences and incentives, like the order in which the options are offered or displayed, for instance. They emphasize the role of social 'nudges'[4], since they state that a shift in behavior can be induced by informing people about what other people are doing. Three social influences that they highlight are information, peer pressure, and priming.

The importance of others' behavior is clearly described in Bicchieri's identification of the necessary conditions for a social norm to exist. The existence of a social norm, as a particular type of norm, is based on shared knowledge, beliefs and expectations about others' behavior and opinions. Group communication leads individuals to reach a common understanding of specific situations and agree on the rules that guide the action in that context. In other words, the process through which individuals receive information about what the others believe and expect about the appropriate behavior in a specific situation makes coordinated action possible. Therefore, social interactions, as a fundamental mode of group communication, play a crucial role in the formation of social norms. They may provide information on which both empirical and normative expectations are supported. Individuals perceive how the others behave and what the others consider a proper behavior.

Thus, social interactions may have several functions: they can provide factual knowledge about the range of alternative actions, inform us about the normative expectations associated with proper

[4] Nudges are "any aspects of the choice architecture that alter people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler and Sunstein, 2008: 6).

behavior, and even serve as a channel to prime people to certain forms of behavior. Interpersonal conversations may modify the categorization that individuals make of particular situations by highlighting certain characteristics instead of others. Thus, the meaning that an action has for a person may change if the way the others interpret it is different.

5.3.2. Hypotheses

As stated, a strong emphasis on the contraceptive function of condom use, with an implicit recognition of its protective side, would encourage the use of this device in formal and marital sexual relations. This might induce a shift in the interpretation that people make about the use of condoms. A new meaning related to contraception desires implies that the suggestion of condom use within marriage would not bring issues of fidelity and trust to the surface. The new meaning would focus the attention on one of the functions at the expense of the other, so the norms that are cued in such a situation are related with reproduction rather than fidelity. Tavory and Swidler (2009) emphasize the relevance of the semiotic framing of condom use and also point out that public health interventions should promote a change in the meaning of condom use. However, they do not focus on the twofold function of this practice, but on the argument that condom use could be alternatively framed as a way of denoting care and love to a trusted partner.

This research attempts to test whether social interactions may modify individuals' attitudes towards condom use within marriage depending on the type of messages that are transmitted through them. It is expected that a prevalent understanding of condom use as an efficient HIV-protection method does not make such a proposition within marriage an easier task, because it reinforces the link between condoms and infidelity. On the contrary, a widespread acceptance and use of modern contraception,

especially condoms for that purpose, should increase the likelihood of an individual having a positive attitude.

In addition, the study explores whether the relative importance of the social support for the two uses of condoms depends on the way the indicator of the respondent's attitude is framed. I consider that the best measures of the attitude towards condoms are the ones that are 'neutral', or in other words, that do not specify the purposes of the use –contraception or protection. So, it could be illuminating to test whether the results change substantially when the specific aim of condom use, and therefore the behavioral rules associated with it, are cued.

5.4. Data and methods

The empirical analysis is based on a quantitative study, using datasets that come from the *Malawi Diffusion and Ideational Change Project* (MDICP) and the *Kenya Diffusion and Ideational Change Project* (KDICP). The data from two waves in each country are used: 1998 and 2001 datasets in Malawi, and 1996 and 1999 datasets in Kenya. The most recent waves of the Malawi project are not analyzed, because only the selected waves offer information about communication networks on both family planning and AIDS. The sampling frame in these surveys is ever-married women of childbearing age and their husbands (if currently married). Given the aim of this research, the units of analysis are married individuals, both men and women.

The two dependent variables analyzed refer to the attitude towards condom use in marriage. The first one is a dichotomous variable –*yes* or *no*- that measures the extent to which condom use could be accepted in the respondent's marital sexual relations. The specific question in the survey is: "*Would you feel comfortable suggesting to your wife that you and she use condoms*?". As argued in the dissertation, to suggest condom use is likely to be interpreted as a signal of distrust when condoms are understood as an HIV-preventive method. Given that this indicator might also be

related to men's and women's skills at spousal communication about intimate matters, some control variables are included in the model. The second question used for constructing a dependent variable is: "*Do you think it is acceptable to use a condom with a spouse to protect against AIDS?*". The latter specifically states the purpose of the use of condoms, while the former is neutral in this sense. This dissimilarity may help me to disclose whether the factors that influence the attitude towards condom use within marriage vary depending on the meaning/purpose of this practice that becomes salient.

Unfortunately, the comparison purpose faces important limitations. A neutral question about the personal attitude towards condom use within marriage in terms of the twofold function of this device is only available in the Kenya database. In turn, the Malawi questionnaire is the only one that enables us to measure attitudes towards the use of condoms with a spouse as an HIV protective strategy.

The explanatory factors on which this study focuses are the dominant attitudes and behaviors in the individual's social network in relation to modern contraception and HIV-preventive sexual practices. The respondent is asked about the characteristics, behavior and opinion of the people, four at most, with whom he/she has talked about family planning on the one hand, and AIDS on the other. The specific questions that are used for the analysis are: *Does [the network partner] use modern family planning with her/his spouse?*, and *"What does [the network partner] think is the best way to protect herself/himself from getting AIDS?"*.[5] The responses to the mentioned questions for all the partners in each network are used for constructing two indicators. The first one measures the proportion of people in the network that use modern contraceptive methods, and the second

[5] It should be noted that each question refers to partners from different communication networks. So, for example, some respondents may have given an answer to the first question, but not to the second one, since they have talked to someone about family planning but with no one about AIDS.

one refers to the proportion of network partners that consider the use of condoms with all extramarital partners as one of the best strategies against HIV infection, both according to the respondent. The continuous measures are categorized, since the aim of this research is to estimate the effect that the clear social acceptance of modern contraception, on the one hand, and of condom use as an HIV preventive practice, on the other, have on the dependent variable. Then, each indicator has three categories that refer to married men with: a network in which more than half of the partners use modern contraception/consider condoms a good HIV-preventive method, a network where half or less of the members fulfill the condition, and no network partner.

The models also include other factors that are expected to have a relevant influence. First of all, it is crucial to take into account variables that refer to the respondent's *interest* in the outcomes of condom use. For that reason, the suspicion of the spouse being unfaithful, as an indicator of the perceived risk of getting infected through non-protected intercourse, and the reported desire of stopping having children are included. Regarding the latter, a lack of data availability prevents us from considering birth spacing intentions as well. In addition, current use of other modern contraceptive methods that are more effective –pills, injectables, IUD, or sterilization- may hinder the negotiation of condom use for pregnancy avoidance.

Given that the central dependent variable may be related to the bargaining power balance in the couple, the models control for a proxy of this aspect. The dichotomous response to the question: *do you think it is acceptable for a woman to divorce an unfaithful husband* is included in the models. The opinion about the acceptability of a man divorcing an unfaithful wife is not considered because almost all men and women agree on this.

Some other control variables are included in the model as well: respondent's age, level of education, type of marriage (monogamous or polygamous), region (only in Malawi) and religion. Table 5.1 shows the summary statistics of all the variables included in the analysis.

The duration of the last marriage could also be relevant, but it is not part of the model because it strongly correlates with the respondent's age. Besides, the relevance of this variable is not evident. Although the use of condoms is more frequent at the beginning of a relationship, since it is not yet founded on high levels of trust and commitment, once the relationship reaches marital status, norms of trust and fidelity, among other things, are expected to be obeyed. As regards the other control variables, the positive influence of education on the use of modern contraception and condoms has been observed in numerous empirical studies (Ainsworth *et al.*, 1996; Lagarde *et al.*, 2001; Zellner, 2003; de Walque, 2007a). Age is usually negatively related with the use of innovations such as modern contraception. Older women also have a lower risk of pregnancy, but it should be noted that the analysis is restricted to women aged between 15 and 49 years. Concerning the type of marriage, it could be that spousal communication is more fluent in monogamous couples. Besides, there might be some kind of competition among wives in polygamous marriages that induces women to avoid conversations that may provoke a conflict with the husband (Pogrebin, 1987). But the opposite effect also makes sense, since women in polygamous unions may also perceive a higher risk of infection given the higher number of vectors of transmission. The effect direction and intensity are ambiguous in theoretical terms. The heterogeneity, especially in terms of the marriage system and women's costs of divorcing, among the three regions of Malawi may involve differences in attitudes towards condom use in marital unions. Matrilineal systems of inheritance, typical from the South and the Center regions, are supposed to reduce women's costs of divorcing, since her family of origin owns the couple's resources (Takyi and Broughton, 2006; Takyi and Gyimah, 2007; Reniers, 2008). Thus, wives can choose to divorce an unfaithful husband instead of negotiating for protected sex. Finally, the strong general opposition of the Catholic Church to artificial contraception is expected to induce more negative attitudes among its followers in comparison with other religions.

Table 5.1. Distribution of the analyzed samples, KDICP 1996 and 1999, and Malawi 1998 and 2001

	Men		Women		Men		Women	
	K 1996	**K 1999**	**K 1996**	**K 1999**	**M 1998**	**M 2001**	**M 1998**	**M 2001**
N	521	564	652	676	1030	1007	1302	1346
Comfortable suggesting CU to spouse	26.9	27.7	28.5	29.9				
Acceptable CU with spouse for HIV protection					10.7	24.5	13.7	28.7
Age[1]	42.6	43.5	31.3	31.4	37.1	40.3	30.5	33.8
	(12.9)	(13.4)	(8.0)	(8.6)	(10.4)	(10.9)	(9.1)	(9.5)
Educational level								
Never attended	10.0	8.1	19.6	15.4	21.4	17.5	34.5	33.0
Primary	59.1	57.1	66.3	70.1	63.6	68.2	60.3	60.8
Secondary	30.9	34.8	14.1	14.5	15.0	14.3	5.2	6.2
Monogamous	66.0	68.4	61.4	62.6	85.2	82.9	77.0	71.0
Region								
South					32.2	31.4	31.3	32.5
Center					36.6	37.4	36.6	35.1
North					31.2	31.2	32.0	32.4
Religion								
Catholic	23.4	21.6	22.7	20.1				
Protestant	64.5	69.5	67.6	73.1				
Others	12.1	8.9	9.7	6.8				
Religion								
Catholic					18.0	17.8	18.1	17.5
Protestant					52.5	53.7	54.9	54.2
Muslim					21.4	21.6	20.6	23.0
Others					8.1	6.9	6.4	5.3
Suspects of infidelity	12.5	8.7	32.8	30.2	6.5	4.3	26.0	26.1
Wants no more children	27.4	31.6	35.6	38.0	26.0	37.7	26.4	38.0

Table 5.1. (Continues)

	Men		Women		Men		Women	
	K 1996	**K** 1999	**K** 1996	**K** 1999	**M** 1998	**M** 2001	**M** 1998	**M** 2001
Uses other modern contraceptive methods now	12.5	9.0	13.2	17.0	21.5	27.4	19.0	23.0
Acceptable for woman to divorce an unfaithful man	63.0	77.8	60.6	71.7			67.5	74.5
Prop. of NP who support CU for HIV prevention								
Half or less	72.5	80.3	68.2	82.7	80.3	76.2	76.3	79.2
More than half	10.2	10.8	8.3	7.1	12.4	21.0	8.5	15.4
No AIDS network	17.3	8.9	23.5	10.2	7.3	2.8	15.2	5.4
Prop. of NP who use modern contraception								
Half or less	44.5	59.1	44.2	60.5	65.3	61.2	66.2	61.7
More than half	30.5	23.2	37.9	28.1	17.3	34.2	21.8	34.8
No FP network	25.0	17.7	17.9	11.4	17.4	4.6	12.0	3.5
Prop. of NP who use condoms as contraception								
Less than half	66.4	77.3						
Half or more	9.2	5.0						
No FP network	24.4	17.7						
Prop. of NP who accept modern contraception								
Half or less	34.9	27.2	31.9	22.5				
More than half	40.1	55.1	50.2	66.1				
No FP network	25.0	17.7	17.9	11.4				

[1] The descriptive statistics for age are the mean and the standard error in parentheses.

The abbreviations CU, FP and NP stand for ‘condom use’, ‘family planning’ and ‘network partners’, respectively.

As regards the methodological approach, both a cross-sectional and a longitudinal analysis of the data are performed. The estimation of the influence of social interactions on individual behavior is challenging since social networks are rarely randomly distributed. Individuals tend to select their interlocutors systematically, usually resulting in groups that share certain characteristics, attitudes and preferences. A panel analysis with fixed effects is suitable for estimating causal effects, given that it allows us to control for the observed and unobserved characteristics that make individuals more prone to interact with specific persons (see Chapter 3 for further details).

5.5. Results

This section is divided into two parts. In the first one, the measure of the individual attitude towards condom use that does not specify the purpose of the use is analyzed as the dependent variable. Given the data constraints, the first part focuses on the Kenyan sample. The second subsection includes the empirical results of the study about the influence of social interactions on individual attitudes towards the use of condoms in marriage as a preventive practice against HIV infection in rural Malawi.

5.5.1. A neutral measure of the attitude towards condom use. Analysis of the Kenya data

A first approach to the study of individuals' attitudes towards suggesting condom use to their spouse is made through a cross-sectional analysis. For this purpose, the data from the two samples have been pooled in order to avoid working with small sets of cases. This technique seems appropriate since there are no particular reasons to believe that the effects of the explanatory variables substantially vary from the first wave to the following one. The results of the multivariate logistic analysis with clustered

standard errors of men and women feeling comfortable suggesting condom use to the spouse are displayed in Table 5.2.

According to the results of Model 1 (Table 5.2), networks where more than half of the partners consider that condom use outside marriage is the best HIV preventive strategy do not make any relevant difference to the individual's attitude towards condom use with a spouse. On the other hand, having a social network in which the majority of people uses modern contraception clearly increases the likelihood of reporting a positive attitude towards the suggestion of condom use to the spouse. The effect is especially strong in the case of men. As was expected, a clear social consensus on the benefits of condom use in terms of HIV prevention does not induce positive attitudes towards condom use within marriage. At the same time, a clear social acceptance of modern contraception facilitates the acceptability of condom use in marital relations, probably because it makes the negotiation of its use more compatible with the rules that regulate marital relations. It should also be noted that the lack of informal interpersonal conversations about family planning in the case of both men and women, and about AIDS as well in the case of men negatively affects the attitude towards condom use within marriage. It makes sense to interpret these findings as some evidence of the damaging consequences of social isolation.

The results of the cross-sectional analysis are coherent with the research hypothesis, since a rooted interpretation of condoms as HIV-preventive devices does not facilitate the acceptance of its use in marriage, whereas a favorable social environment for modern contraception makes the introduction of condoms in marital sexual relations easier.

Table 5.2. Multivariate logit regression of reporting feeling comfortable suggesting condom use (CU) to spouse, men and women in Kenya, pooled data from 1996 and 1999

	MEN			WOMEN	
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 3**
Age	-0.030***	-0.028***	-0.026***	-0.012	-0.012
	(0.008)	(0.008)	(0.008)	(0.010)	(0.009)
Level of education					
Never attended School (ref)	-	-	-	-	-
Primary	0.668*	0.606	0.654*	0.387*	0.363*
	(0.363)	(0.371)	(0.377)	(0.198)	(0.198)
Secondary	1.013***	1.026***	1.049***	0.625**	0.596**
	(0.382)	(0.385)	(0.396)	(0.247)	(0.248)
Monogamous	-0.177	-0.165	-0.197	0.169	0.152
	(0.189)	(0.184)	(0.188)	(0.140)	(0.140)
Religion					
Catholic (ref)	-	-	-	-	-
Protestant	0.413**	0.443**	0.374*	0.183	0.191
	(0.196)	(0.196)	(0.201)	(0.170)	(0.170)
Others	0.251	0.288	0.235	0.358	0.358
	(0.341)	(0.347)	(0.337)	(0.264)	(0.268)
Suspects of infidelity	0.941***	0.957***	0.933***	0.835***	0.830***
	(0.229)	(0.226)	(0.221)	(0.131)	(0.131)
Wants no more children	0.235	0.382*	0.154	0.125	0.096
	(0.202)	(0.201)	(0.199)	(0.151)	(0.151)
Uses other modern contraceptive methods now	0.101	0.100	0.148	-0.007	-0.018
	(0.263)	(0.253)	(0.260)	(0.181)	(0.180)
Acceptable for woman to divorce an unfaithful man	0.324*	0.320*	0.238	0.005	-0.022
	(0.170)	(0.169)	(0.167)	(0.140)	(0.140)

Table 5.2. (Continues)

	MEN			WOMEN	
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 3**
Proportion of NP who support CU for HIV prevention[1]					
Half or less (ref)	-	-	-	-	-
More than half	0.254	0.178	0.231	0.212	0.215
	(0.212)	(0.217)	(0.219)	(0.225)	(0.224)
No AIDS network	-0.625*	-0.600*	-0.558*	-0.248	-0.238
	(0.328)	(0.331)	(0.319)	(0.197)	(0.199)
Proportion of NP who use modern contraception					
Half or less (ref)	-			-	
More than half	0.898***			0.362**	
	(0.162)			(0.141)	
No FP network	-0.479*			-0.379*	
	(0.252)			(0.222)	
Proportion of NP who use condoms for contraception					
Less than half (ref)		-			
Half or more		1.620***			
		(0.252)			
No FP network		-0.625**			
		(0.251)			
Proportion of NP who accept modern contraception					
Half or less (ref)			-		-
More than half			1.052***		0.562***
			(0.183)		(0.154)
No FP network			-0.159		-0.155
			(0.281)		(0.241)

Table 5.2. (Continues)

	MEN			WOMEN	
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 3**
Constant	-1.305**	-1.263**	-1.699***	-1.539***	-1.760***
	(0.612)	(0.610)	(0.635)	(0.416)	(0.424)
N	1085	1094	1093	1321	1323

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

Clustered standard errors in parentheses

[1] The abbreviations CU, FP and NP stand for 'condom use', 'family planning' and 'network partners', respectively.

The hypothesis about the relevance of the meaning of condom use would be better tested when using an explanatory variable that refers to the specific use of condoms as a contraceptive method by the network partners instead of their use of any modern contraceptive devices. A more direct measure of the network behavior in relation to condoms is thus constructed, given that the respondents are also asked the specific method used by those network partners who use modern family planning.[6] Unfortunately, this indicator cannot be used in the analysis for women, because there is not enough variability –very few partners are reported to use condoms. For this reason, this indicator has not been used in first place, since the intention is to apply the model to both married men and women's responses.

The original indicator, then, is substituted for this alternative one in Model 2, only for men, in order to improve the analysis and check the robustness of the results. The fact that half or more of the network partners use condoms as a contraceptive method strongly increases the likelihood of reporting a positive attitude towards condom use. [7] On the other hand, networks where most

[6] Only one method can be reported.

[7] It is not appropriate for the statistical inference to construct an indicator in which the highest category is 'more than half of the network

people recommend condom use outside marriage as an HIV-preventive strategy do not make any difference to the respondent's attitude. In sum, the social acceptance of condoms for contraceptive purposes makes married men more willing to suggest condom use to their spouse, while extensive support of condom use as a preventive practice has no influence. Again, the results support the hypothesis about the beneficial effect of the interpersonal conversations that emphasize the contraceptive function of condom use.

A model with another alternative measure about the acceptance of modern contraception in the network is also tested with the same purpose of refining the analysis and checking the robustness of the results. The indicators of social acceptance of modern family planning that have been used above measure the network partners' related behavior, while the indicator of social support of condoms as a preventive practice refers to partners' attitudes or opinions. So, it could be that the differences in the relative importance of these variables for explaining personal attitudes towards condom use within marriage are due to the fact that others' behavior might be more influential than others' mere opinions. If that were the case, the previous models could lead us to wrongly affirm that the emphasis on the contraceptive function is the important factor. Thus, the previous indicator is substituted by the proportion of network partners who approve family planning according to the respondent (Model 3). The interlocutors' approval of family planning refers to their opinions, but not necessarily to their activities. Again, a dominant social support of contraceptive use strongly increases the likelihood of having a positive attitude.

Concerning the control variables in the models, some findings should be highlighted. The coefficient of age is only statistically significant for men, probably because no women over 49 years old are included in the analysis. Old men are more likely to be married

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partners' as the categorization of the other measures, because less than 5% of men have networks with such a characteristic.

with old women, who have lower risk of pregnancy. Besides, old men might be more reluctant to adopt new methods of contraception and protection. The level of education is, as expected, a relevant factor. Those men and women who have never attended school are much less likely to have a positive attitude towards condom use suggestion than the rest, especially in comparison with those that have attended secondary or higher levels. The type of marriage does not make any difference in all the models. Catholic men tend to be more unwilling to proposing this practice to their wives compared to Protestants; however, the religion variable is not relevant in the analysis of women's attitude.

As regards the measures of potential individual interest in condom use, it must be highlighted that the suspicion of infidelity has the strongest effect in the analysis for women (Table 5.2). The influence is also notable for Kenyan men. As has been found in studies of condom use in marriage (Westercamp *et al.*, 2010), the perception of HIV risk through marital sex is a crucial explanatory variable. It makes sense to interpret that the desire for protection may be the main motivation for the suggestion of condom use within marriage, even when it is proposed in terms of contraception intentions. The lack of statistical significance of the coefficients of the birth stopping desire in all the models for women and in Models 1 and 3 for men is quite surprising. Perhaps, the effect would have been stronger if spacing intentions were also taken into consideration. In Model 2 for men, however, this indicator is significant, so both types of motivations, perceived HIV risk and pregnancy avoidance, may have some impact on married men's attitude towards the proposal of condom use within marriage.

The use of other modern contraceptives does not seem to decrease the likelihood of feeling comfortable suggesting condom use. Although it has been pointed out that condoms may be less likely to be used for contraception purposes when more efficient methods are being used, I do not find that association in this study. However, it could be possible that this measure involves two

opposing effects, given that many of the characteristics of people who have already adopted the behavior of using modern contraception favor condom use as well.

A positive attitude towards the 'exit' option for women, or, more specifically, their capacity for leaving an unfaithful husband, has a positive and significant effect only when men are the units of analysis. One way of interpreting this result refers to men's implication in the couple's reproductive health. Those men who are more prone to accepting some degree of female autonomy may also be more aware of women's or couple's reproductive concerns, and less inclined to defend a traditional male role, which emphasizes the capacity to procreate. It is surprising that this trait does not make women feel more comfortable with the suggestion of condom use. Nevertheless, it is likely that wives' actions and willingness to suggest a behavior to be adopted by the couple depend much more on their partner's opinions and attitudes than what husbands' actions do.

A longitudinal analysis is carried out in order to improve the study of married individuals' attitude towards condom use within marriage. This statistical approach may help us to improve our estimations and deal with the problem of the selection of social networks. The panel analysis with fixed effects controls for the unobserved heterogeneity among respondents when this diversity does not change from one wave to the other for each individual. Therefore, we are not forced to assume that such heterogeneity is uncorrelated with the regressors. This is especially useful for the study of the effect of social interactions, since social networks are unlikely to be distributed randomly among the population. Individuals tend to actively select their interlocutors, usually choosing people with whom they share common interests and opinions. The estimated influence of the interactions with these interlocutors through traditional techniques will be incorrect when the characteristics that lead to select certain people instead of others also affect the dependent variable. Given that the analysis controls for the (observed and unobserved) characteristics that do

not change from one wave to the following one, only time-variant variables are included in the model.

The results of the longitudinal analysis are displayed in Table 5.3 and Table 5.4, for men and women respectively. Models 4, 5 and 6 are similarly specified, but they differ in the indicator with which the social acceptance of the contraceptive function is measured. They are, then, analogous to Models 1, 2 and 3, respectively. Both linear probability (LP) estimates and logit estimates are provided for each model. As it has been explained in Chapter 3, the panel logit analysis with fixed effects has an important limitation. The sample is reduced to those individuals who have experienced a shift in the dependent variable from one wave to the other. However, the estimation process of a linear fixed-effects model does not require restricting the sample. For that reason, linear probability estimates are shown together with the logit estimates for comparison. The longitudinal analysis supports the main hypothesis in this research, at least for men. According to Models 4, 5 and 6 in Table 5.3, the social acceptance of modern contraception, and specifically the use of condoms for this purpose, increases the likelihood that a husband reports feeling comfortable suggesting condom use to his wife. On the other hand, the social consensus on the benefits of condoms for HIV prevention does not affect the respondent's attitude. The linear probability models and the logit models provide similar results in this regard.

Table 5.3. (Men) Panel analysis (linear probability and logit models) with fixed effects of feeling comfortable suggesting condom use (CU) to the spouse, Kenya 1996-1999

	Model 4		**Model 5**		**Model 6**	
	LPM	**Logit**	**LPM**	**Logit**	**LPM**	**Logit**
Monogamous	-0.012	-0.480	0.005	0.042	0.013	-0.228
	(0.072)	(0.582)	(0.072)	(0.547)	(0.071)	(0.575)
Suspects of infidelity	0.134**	1.048**	0.132**	0.977**	0.130**	0.762
	(0.063)	(0.510)	(0.064)	(0.467)	(0.063)	(0.480)
Wants no more children	-0.014	0.078	-0.001	0.005	-0.038	-0.133
	(0.055)	(0.426)	(0.056)	(0.394)	(0.056)	(0.418)
Uses other modern contraceptive methods now	-0.123*	-1.191**	-0.045	-0.457	-0.098	-0.703
	(0.065)	(0.538)	(0.064)	(0.479)	(0.063)	(0.488)
Acceptable for a woman to divorce an unfaithful man	0.066	0.350	0.076*	0.591*	0.06	0.455
	(0.043)	(0.369)	(0.044)	(0.351)	(0.043)	(0.366)
Proportion of NP who support CU for HIV prevention						
Half or less (ref)	--	--	--	--	--	--
More than half	0.043	0.003	0.020	-0.149	0.039	-0.106
	(0.071)	(0.525)	(0.073)	(0.506)	(0.072)	(0.522)
No AIDS network	0.004	0.339	0.002	0.327	-0.005	0.163
	(0.069)	(0.607)	(0.070)	(0.595)	(0.069)	(0.615)

Table 5.3. (Continues)

	Model 4		Model 5		Model 6	
	LPM	**Logit**	**LPM**	**Logit**	**LPM**	**Logit**
Proportion of NP who use modern contraception						
Half or less (ref)	--	--				
More than half	0.209***	1.589***				
	(0.049)	(0.456)				
No FP network	-0.065	-0.804				
	(0.057)	(0.571)				
Proportion of NP who use condoms for contraception						
Less than half (ref)			--	--		
Half or more			0.216***	1.180*		
			(0.080)	(0.613)		
No FP network			-0.094	-1.070**		
			(0.057)	(0.536)		
Proportion of NP who accept modern contraception						
Half or less (ref)					--	--
More than half					0.203***	1.233***
					(0.047)	(0.379)
No FP network					-0.014	-0.550
					(0.061)	(0.588)
Year	0.000	-0.025	-0.005	-0.049	-0.013	-0.121
	(0.010)	(0.080)	(0.010)	(0.075)	(0.009)	(0.078)
N	812	230	818	234	818	234

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

Standard errors in parentheses

The analysis for women, however, does not offer conclusive results. While the cross-sectional analysis was coherent with the research hypothesis, none of the variables about social interactions are statistically significant in Models 4 and 6 for women (Table 5.4). Thus, there is not enough evidence to support the hypothesis that the social acceptance of the contraceptive function of condoms has a causal effect on rural Kenyan women's attitude.

Table 5.4. (Women) Panel analysis (linear probability and logit models) with fixed effects of feeling comfortable suggesting condom use (CU) to the spouse, Kenya 1996-1999

	Model 4		**Model 6**	
	LPM	**Logit**	**LPM**	**Logit**
Monogamous marriage	0.025	-0.240	0.020	-0.325
	(0.082)	(0.603)	(0.083)	(0.610)
Suspects of infidelity	0.190***	1.316***	0.192***	1.367***
	(0.046)	(0.345)	(0.046)	(0.346)
Wants no more children	0.035	0.258	0.044	0.281
	(0.048)	(0.355)	(0.048)	(0.355)
Uses other modern contraceptive methods now	-0.061	-0.515	-0.068	-0.584
	(0.059)	(0.375)	(0.060)	(0.381)
Acceptable for a woman to divorce an unfaithful man	-0.022	-0.044	-0.019	-0.068
	(0.041)	(0.274)	(0.041)	(0.275)
Proportion of NP who support CU for HIV prevention				
Half or less (ref)	--	--	--	--
More than half	0.049	0.539	0.049	0.471
	(0.070)	(0.489)	(0.070)	(0.493)
No AIDS network	-0.022	-0.033	-0.011	0.065
	(0.059)	(0.494)	(0.058)	(0.491)

Table 5.4. (Continues)

	Model 4		Model 6	
	LPM	**Logit**	**LPM**	**Logit**
Proportion of NP who use modern contraception				
Half or less (ref)	--	--		
More than half	-0.021	-0.038		
	(0.044)	(0.286)		
No FP network	0.012	-0.020		
	(0.067)	(0.580)		
Proportion of NP who accept modern contraception				
Half or less (ref)			--	--
More than half			0.014	0.271
			(0.048)	(0.344)
No FP network			0.008	-0.013
			(0.069)	(0.581)
Year	0.003	0.044	0.004	0.045
	(0.009)	(0.067)	(0.010)	(0.067)
N	919	286	922	290

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

Standard errors in parentheses

Regarding the time-variant control variables, the suspicion of infidelity notably increases the likelihood of reporting a positive attitude towards the suggestion of condom use to the spouse. So, the perception of infection risk seems to be the most important motivation for the suggestion of this device. Current use of other modern contraceptive methods negatively and significantly influences the dependent variable in Model 4 for men (both in the LPM and in the Logit M), in contrast with the cross-sectional analysis. This result is in line with the concern that the use of more effective contraceptive methods may hinder the proposition of using condoms with this purpose. The fact that this indicator becomes significant in the fixed-effects analysis may be due to the

fact of controlling for unobserved time-invariant characteristics of the man that make him more prone to both using other modern contraceptives and having a positive attitude towards condoms at the same time. Then, the fixed-effects analysis estimates the pure effect of the variable.

5.5.2. A measure of the attitude towards condom use that specifies the purpose. Analysis of the Malawi data

The results in the previous subsection have shown that the individual's perception about the extent to which modern contraception, especially condom use, is socially supported notably increases the likelihood of reporting feeling comfortable suggesting condom use to the spouse. At the same time, a prevailing social agreement that condom use outside marriage is a good strategy against HIV infection does not substantially affect the dependent variable. The evidence that has been provided for women is weaker, because the longitudinal analysis supports the hypothesis only partially.

In this subsection, the analysis is replicated but using a dependent variable that specifies the aim of condom use. Respondents are asked if they think it is acceptable to use condoms with a spouse to protect against HIV infection. Unfortunately, this question is only included in the questionnaire of the Malawi project. So, it is not possible to make a proper comparison about the difference in relevance of the explanatory factors depending on the type of dependent variable. However, I consider that it is interesting to explore, even with the mentioned limitations, whether the interpretation of condom use is always the same or it changes when certain characteristics instead of others are primed. In this case, one of the functions is highlighted, so all behavioral rules associated with such a context are cued.

Table 5.5 displays the results of the cross-sectional analysis, which consists of a multivariate logistic regression applied to the pooled data from the 1998 and 2001 waves of the Malawi

longitudinal survey. The model is similar to that in the Kenya analysis, with small differences. On the one hand, the region variable is introduced, since the survey was conducted in the three regions in which the country is divided. On the other hand, the variable that measures the respondent's agreement with the acceptability of a woman divorcing an unfaithful husband is not included in the analysis of married men, because this information is not available in both waves. However, it is worth mentioning that this variable has a negative effect on the attitude towards condom use within marriage for HIV protection according to a similar model that is only fitted to the 2001 wave data, where the information is available.[8] So, contrary to what happens when the function of condom use is not specified in the dependent variable (models in Tables 5.2 and 5.3), those men who accept women's capacity to leave a husband are against the use of condoms within marriage for HIV prevention. It could be that these men think that a wife is not likely to or should not resign herself to her husband's infidelity and use condoms for protection. This could imply, therefore, that condom use within marriage for preventive purposes, or at least the acceptability of this practice, is less problematic in contexts of unbalanced power between the spouses.

Contrary to what it can be observed in the models in Table 5.2, the proportion of network partners that consider condom use with extramarital partners the best strategy for them against HIV infection is a relevant factor for explaining the acceptance of condom use inside marriage for protection (Model 7 in Table 5.5). The likelihood that a husband or a wife reports a positive attitude notably increases when more than half of the network makes this recommendation, that is to say, when the support for this preventive behavior is widespread in the social environment. A network that supports the use of modern contraception is also a relevant factor in the case of men. In Model 7 for women the coefficient does not reach the significance threshold. Therefore,

[8] The results of this analysis are not shown here, but available from the author upon request.

the relative importance of the two social interactions variables is quite different to that observed in the analysis of a neutral dependent variable about condom use within marriage in rural Kenya (Table 5.2). This is the kind of result I was expecting to find.

Concerning the control variables in the model, it should be noted that the level of education is not relevant, contrary to what was observed in the analysis of the neutral dependent variable. This is in line with the interpretation that was put forward above about the effect of the opinion about the acceptability of women's decision of divorcing. Condom use for preventive purposes may not be easily introduced in marital relations in which less traditional views of women's roles are defended, since husbands' extramarital behavior should be less tolerated by their wives. As regards the region, men and women in the South are much more likely to have a positive attitude towards condom use in marriage for protection. In this region, extramarital sexual relations are more common than in the rest of the country (Clark, 2010), as the results in Chapter 4 show. Besides, the marriage system is matrilocal, so the couple lives in the wife's home or village and the lineage follows a matrilineal system of inheritance. The marriage system in the North region is patrilineal and patrilocal and there is a mix of systems in the Center region (Helleringer and Kohler, 2005). The level of education is usually lower and polygamous unions are less frequent among people in the South. Since the model controls for education and type of marriage, it is possible that the strong effect of the region has to do with the acceptability or tolerance of extramarital sex. Condom use within marriage as a strategy for HIV protection is less in conflict with the rules that regulate marriage in the South region, since the fidelity norm is perceived less powerful. However, higher acceptance of this practice may not induce a greater level of condom use with the spouse, since women are also more able to divorce unfaithful men, given the characteristics of the inheritance system in the South.

Table 5.5. Multivariate logit regression of accepting condom use (CU) with a spouse to protect against AIDS, men and women in Malawi, pooled data from 1998 and 2001

	MEN	**WOMEN**
	Model 7	**Model 7**
Age	0.010	0.002
	(0.006)	(0.008)
Level of education		
Never attended school (ref)	--	--
Primary schooling	0.166	0.112
	(0.155)	(0.133)
Secondary schooling	0.136	0.134
	(0.241)	(0.255)
Region		
South (ref)	--	--
Center	-0.750***	-0.911***
	(0.198)	(0.179)
North	-0.393*	-0.565***
	(0.207)	(0.184)
Religion		
Catholic (ref)	--	--
Protestant	-0.176	0.002
	(0.171)	(0.149)
Muslim	0.319	0.143
	(0.232)	(0.199)
Others	0.039	0.086
	(0.264)	(0.233)
Monogamous marriage	0.028	-0.070
	(0.162)	(0.113)
Uses other modern contraceptive methods now	0.003	0.258**
	(0.146)	(0.125)
Acceptable for a woman to divorce an unfaithful man		0.112
		(0.113)

Table 5.5. (Continues)

	MEN Model 7	WOMEN Model 7
Suspects of infidelity	0.837***	0.371***
	(0.219)	(0.110)
Wants no more children	0.171	0.026
	(0.136)	(0.129)
Proportion of NP who support CU for HIV prevention		
Half or less (ref)	--	--
More than half	0.578***	0.590***
	(0.123)	(0.144)
Has no AIDS network	0.267	-0.151
	(0.307)	(0.185)
Proportion of NP who use modern contraception		
Half or less (ref)	--	--
More than half	0.319**	0.103
	(0.139)	(0.116)
Has no Family-Planning network	-0.641***	-0.220
	(0.243)	(0.210)
Constant	-2.127***	-1.314***
	(0.404)	(0.354)
N	2037	2538

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

Clustered standard errors in parentheses

None of the religion categories are statistically significant. Since Muslims are concentrated in the South, this category is correlated with the region, which may be absorbing the whole effect. Actually, Muslims, both women and men, are much more likely to accept condom use within marriage for protection when

the region variable is extracted from the model.[9] It must be noted that the communication between the Malawian Islamic community and the Arabic communities was broken down since the abolition of slave trade, so Muslims in Malawi have traditionally showed a very particular practice of Islam (Chimbiri, 2006). However, the influence of foreign Muslim communities has increased in the last three decades and the Islamic orthodoxy is gaining ground (Chimbiri, 2006).

As expected, the suspicion of infidelity is the most important motivating factor for the acceptability of this preventive practice, and the desire to stop having children does not have any influence. Suspicion was also very relevant in the analyses presented in the previous subsection. Thus, the need for protection seems to be crucial to the attitude towards condom use with a spouse independently of the terms in which this practice is raised.

Current use of other modern contraceptive methods has a positive and significant effect in the women analysis. It could be that women who make use of these methods have some characteristics that make them more prone to accept an innovation like condom use.

A longitudinal analysis of accepting condom use within marriage for HIV protective purposes is performed (Table 5.6). For women, having a network where more than half of the partners consider condom use as a good strategy against HIV increases the likelihood of accepting the practice within marriage for a preventive purpose. The effect is clearly significant in the linear probability model, but not in the logit model. None of the social network variables are statistically significant in the case of men. A causal effect of the social network is thus only partially observed in the analysis of women's attitude. Therefore, both the cross-sectional and the longitudinal analyses show that for women and men the relative importance of the social acceptance of each function of condom use –contraception and HIV prevention– is different when the dependent variable specifies the purpose of

[9] The results of this model are not shown.

using condoms. While the prevailing acceptance of modern contraception was crucial for understanding the personal attitude towards condom use within marriage, no substantial effect is found for that variable when studying the attitude towards using condoms with a spouse in order to protect from HIV infection. Thus, the results support the second hypothesis of this research.

Table 5.6. Panel analysis (linear probability and logit models) with fixed effects of accepting condom use (CU) with a spouse to protect against AIDS, men and women in Malawi, 1998-2001

	MEN		**WOMEN**	
	Model 8		**Model 8**	
	LPM	**Logit**	**LPM**	**Logit**
Monogamous marriage	0.002	0.083	-0.036	-0.078
	(0.060)	(0.636)	(0.053)	(0.450)
Uses other modern contraceptive methods now	0.007	-0.086	0.033	0.093
	(0.037)	(0.330)	(0.036)	(0.276)
Acceptable for a woman to divorce an unfaithful man			0.010	0.023
			(0.030)	(0.239)
Suspects of infidelity	0.116*	1.161**	0.048	0.252
	(0.064)	(0.539)	(0.032)	(0.249)
Wants no more children	-0.006	-0.080	0.022	0.150
	(0.036)	(0.313)	(0.036)	(0.269)
Proportion of NP who support CU for HIV prevention				
Half or less (ref)	-	-	-	-
More than half	0.026	0.322	0.109***	0.504
	(0.037)	(0.301)	(0.042)	(0.318)
No AIDS network	0.058	0.723	0.027	0.083
	(0.069)	(0.684)	(0.049)	(0.425)

Table 5.6. (Continues)

	MEN		WOMEN	
	Model 8		Model 8	
	LPM	**Logit**	**LPM**	**Logit**
Proportion of NP who use modern contraception				
Half or less (ref)	-	-	-	-
More than half	-0.006	-0.320	0.024	0.274
	(0.034)	(0.327)	(0.030)	(0.233)
No FP network	0.010	-0.470	0.039	0.364
	(0.047)	(0.510)	(0.053)	(0.436)
Year	0.048***	0.403***	0.046***	0.330***
	(0.007)	(0.064)	(0.007)	(0.053)
N	1540	418	1866	538

*** pvalue<0.01; ** pvalue<0.05; * pvalue<0.10

Standard errors in parentheses

5.6. Conclusions

The empirical analysis of the rural Kenyan sample that has been shown in this paper shows that a married person's attitude towards condom use in marital sexual intercourse is very much affected by some attitudes and behaviors that are prevalent in her social network. Specifically, the acceptance and use of modern contraception, especially condom use, by most people in the network notably increases the likelihood that a person, a man or a woman, reports that he/she would feel comfortable suggesting condom use to his/her spouse. However, a widespread opinion in the network that condom use with extramarital sexual partners is a good strategy against HIV infection does not influence the respondent's attitude. The results especially support these two statements in the case of men, given that the results for women are

less consistent when panel analyses with fixed-effects are carried out.

The models have been specified in order to test the theoretical argument that a person's attitude towards condom use within marriage, which is supposed to depend on her interpretation of the situation, varies according to the meaning that this practice has for the people around her and the social acceptance of its use or the use of other devices that fulfill similar functions. This implies that social interactions may affect individual attitudes, and behaviors, through both social influence and priming. It is very difficult to disentangle these two processes empirically, especially by analyzing data that have not been collected for this purpose through statistical techniques. Such task is not performed in this research study. I simply compare the relative influence of two types of messages that are received through interpersonal communication. Each of them emphasizes one of the two functions of condom use, HIV prevention and contraception. Moreover, the extent to which the attitudes and behaviors that the messages refer to are prevalent in the social network is also taken into consideration. The indicators measure the presence of a high proportion of network partners that have a particular opinion or behave in a particular way. So, it can be tested if the individual's attitude depends on whether certain attitudes and behaviors are dominant in the social environment, a fundamental condition for ordinary individuals to follow a norm.

A second part of the empirical analysis is presented in order to offer more evidence about the importance of the way in which condom use is interpreted, that is, the meaning of the action. The idea is that the relevance of each explanatory factor may vary when the particular purpose of condom use is stated explicitly. Thus, the results of the analysis should be different when the dependent variable specifies the intention for using condoms within marriage. In order to test this hypothesis, the same model is replicated but with a different dependent variable, which is individuals' opinions about the acceptability of using condoms with a spouse for preventing HIV infection. Unfortunately, this

information is not available in the Kenya questionnaire. However, the research can be done using the data provided by a sister project developed in rural Malawi. Its questionnaire is quite similar and it has been designed to extract information about the same issues. The results of the cross-sectional analysis show that prevailing social support of condom use as a preventive practice against HIV infection has a positive and significant effect on individual acceptance of condom use within marriage for this purpose. At the same time, the use of modern contraception by the people in the social network has also some impact, but only in the case of men. In the longitudinal analysis, however, none of the factors related with social interactions are statistically significant in the models for men and only the social acceptance of condom use for protection influences women's attitude according to the linear probability model. It is obvious that these results cannot be directly compared to those obtained from the Kenya data. However, it is of interest to check that, when explaining the respondent's attitude towards condom use within marriage specifically for preventing HIV infection, the relevance of the socially prevalent attitudes and behaviors related to the two purposes of condom use is far from being that observed in the examination of the respondent's attitude towards condom use within marriage (without specifying the aim of the use).

The lack of data does not allow us to examine if a positive attitude towards condom use within marriage finally lead to a higher likelihood of using this device with a spouse. The question about condom use with the current spouse is not included in any wave of the Kenya longitudinal survey, and it is only incorporated in the 2004 and 2006 waves in the Malawi survey.[10] For the reasons that have been mentioned, I expect that a positive attitude towards condom use in marital sex for HIV prevention is less

[10] Respondents in waves 1998 and 2001 are asked about the contraceptive methods that they are using, and condoms are one of the options. However, a measure constructed with this information would not be appropriate because it involves an explicit purpose for the use of condoms.

likely to spread among the female and male populations, and much less likely to translate into more condom use within marriage. The acceptance of condom use with a spouse would be more effective if it were mainly based on the interpretation of this practice as a contraceptive strategy by both partners.

The point of departure in this research is the idea that the promotion of condom use as an HIV-preventive method has contributed to the widespread association between condoms and commercial and casual sex. It seems that prevention campaigns should revise their strategies, since a great share of new HIV infections in sub-Saharan Africa take place in stable couples. Moreover, the interpretation of condom use as a preventive practice may discourage married couples from using this device, given that HIV is mainly transmitted through heterosexual contact in the region and sexual infidelity is normatively disapproved of. However, the evidence provided in this study is coherent with the idea that suggesting condom use to a spouse is perceived as an easier task, at least by men, when condoms are commonly used as a contraceptive method.

This finding has important policy implications. The promotion of condom use should highlight its contraceptive benefits rather than keep emphasizing the suitability of this device for HIV protection in high-risk sexual encounters. This would make condom use more compatible with the norms that regulate not only marriage, but also other steady relationships. In addition, prevention campaigns should take into consideration that at least men's attitudes towards condom use within marriage are clearly affected by the prevailing attitudes and behaviors in the network. Peer education programs and activities addressed to groups might be more efficient than visiting people at their homes, since they facilitate group communication and help to update expectations about what the others know and think.

Another finding of this research must be highlighted. The suspicion of the spouse being unfaithful plays a key role in the explanation of the attitude towards condom use within marriage. It seems that the principal motivation for the acceptance of condom

use is still the perception of risk of infection. However, this does not imply that condoms are suggested in these terms to the spouse. Nonetheless, the importance of this motivating factor should decrease as the promotion of condom use emphasizes its contraceptive function.

CHAPTER 6. EXPLAINING CONDOM USE WITHIN MARRIAGE AND HUSBAND-WIFE DISCREPANCIES IN REPORTS OF THIS PRACTICE[1]

Chapter 4 has shown that, in rural Malawi, married men's extramarital behavior is affected by their perceptions about the proportion of people in their social networks that have extramarital sexual partners. Such perceptions or empirical expectations about the fidelity norm might influence another practice that alters the risk of HIV infection: the use of condoms within marriage. Chapter 5 shows that married men's acceptance[2] of condom use with a spouse in rural Kenya increases when the use of modern contraceptive methods, especially condoms, is a common practice in the social network. This result is in line with the idea that a widespread interpretation of condoms as a contraceptive method instead of an HIV protective device favors its use within marriage because it makes this action more compatible with the norm of fidelity that regulates marriage. However, condoms could be introduced in marital sex if the norm of fidelity were weak. This chapter analyzes whether the use of condoms by married couples increases when the compliance with the fidelity norm in the social

[1] A version of this chapter is under review in the Journal of Marriage and Family. Professor Richard Breen is the second author of the article.

[2] The analysis is less conclusive in the case of married women, because only the cross-sectional analysis supports the hypothesis.

network is perceived to be low. The relevance of reproduction and the biasing effect of socially desirable responses are also examined.

6.1. Introduction

Around 67% of all people infected with the HIV virus live in sub-Saharan Africa (UNAIDS and WHO, 2009). Furthermore, HIV infection here is widespread among the heterosexual population, in contrast to the situation in other parts of the world where the phenomenon is concentrated on high-risk groups, such as injecting drug users, men who have sex with men, or sex workers (UNAIDS and WHO, 2007; 2009). One of the most convincing explanations of why this is so argues that the spread of the epidemic in this region is not due to individuals having high numbers of sexual partners *per se* but to the common practice of simultaneous long-term relationships (Morris, 1995; 1997). In several parts of this region extramarital sexual relations are common, especially among men. According to the nationally representative Demographic and Health Surveys (DHS), around 20% or more of married men in Tanzania (2004/05), Uganda (2006), Mozambique (2003), Namibia (2000), and Zambia (2001/02) report having had extramarital sex in the previous 12 months. In Malawi (2004), Kenya (2003), and Zimbabwe (2005/06) the figure is lower –about 10%. Women are much less likely to report sexual relations outside of marriage. Nonetheless, some qualitative (Tawfik, 2003; Tawfik and Watkins, 2007) and quantitative studies (de Walque, 2007b) suggest that such affairs may not be rare, although they do not offer specific estimates. Alternative ways of approaching this issue in surveys show that the phenomenon might be more frequent. In the dataset use in this study, 15% of married women and 24% of married men in rural Malawi report that their best married friend (female and male respectively) had extramarital sexual partners in the previous year (MDICP 2004). As a result, even faithful married individuals are

at high risk of becoming infected because their partner may have short and long-term sexual relations outside marriage.

This risk would be considerably less if condom use were a normal practice. However, the level of reported condom use is still low in casual relations, and even lower in marital relations (Cleland and Ali, 2006; Bankole *et al.*, 2007; Chimbiri, 2007; Hendriksen *et al.*, 2007; de Walque and Kline, 2011). The lack of condom use in marital relations has important negative consequences for the population, since marriage is the context were most sexual intercourse takes place and so the likelihood that a non-infected member of a marital couple becomes infected is high. Besides, reproduction is embedded in marriage and children may become infected during pregnancy or delivery, so affecting their health, and they are more likely to become orphans, so affecting their socioeconomic condition.

For these reasons it is of special interest to focus on preventive behavior within marital relations in sub-Saharan countries. Specifically, it is important to identify why married individuals have unprotected sexual relations within marriage in societies where extramarital sex is not rare, especially among men, and the perceived risk of becoming infected is very high, given that the great majority knows someone who has died of AIDS (Smith and Watkins, 2005). Moreover, several studies show that the sub-Saharan population has a good knowledge about the mechanisms by which HIV can be transmitted and how it can be protected against (Lindan *et al.*, 1991; Neequaye *et al.*, 1991; Barden-O'Fallon *et al.*, 2004; Nachega *et al.*, 2005).

This chapter has both a substantive and methodological goal. Substantively, I analyze the relationship between condom use in marital relations in rural Malawi and three factors which are believed to be an important predictor of it. These factors and the hypotheses about them are discussed in more detail in the ensuing section of the chapter. Methodologically the analysis is intended to overcome the problem that arises when a question asked of both spouses – in this case whether they use condoms in their marital sexual relations – elicits conflicting responses. To this end latent

class models are used to capture the true or latent response and the study also investigates factors that may help to explain the discrepancy between the respondent's manifest and latent response.

6.2. Actual and reported use of condoms in marriage

I expect that an important factor in determining whether or not a couple uses condoms in their marital sexual relations is whether the husband or wife believes that his or her spouse has been unfaithful and that there is thus a risk of contracting the virus.[3] Nonetheless, some further facilitating conditions are required in order for condoms to be used, because condom use conflicts with established social norms about marriage. Despite the prevalence of extramarital sexual activity[4], marriage in Malawi is supposed to be based on trust, faithfulness and legitimate sex and reproduction, among other social norms (Watkins, 2004; Smith and Watkins, 2005; Chimbiri, 2007; Tavory and Swidler, 2009), and this militates against condom use within marriage as a preventive strategy. Attitudes towards the use of condoms are likely to depend, in part, on personal beliefs or expectations about the social acceptability of condom use that individuals update through social interactions. Those individuals who perceive that extramarital sexual relations are common among the people with whom they usually talk may believe that the norm of marital fidelity is weak and this may increase their likelihood of using condoms in marriage. A social norm, such as fidelity, exists when a sufficient subset of the population knows the rule and each

[3] That would not be the case if condoms were exclusively used for contraceptive purposes. However, I argue that the perception of risk may motive the use of condoms even when individuals are also interested in the contraceptive function of this device.

[4] National levels of reported extramarital sex in the previous 12 months among married men vary between 15% and 8% (DHS, 2000 and 2004). In rural Malawi, the level is 12% (MDICP, 2004).

person prefers to conform to it when she believes that a relevant proportion of the others expects her to conform to the rule (*normative expectations*) and a relevant proportion of the others actually conforms to the rule (*empirical expectations*) (Bicchieri, 2006). The strength of the norm as a behavioral rule depends on the coherence of these two types of expectations, so that the likelihood that an individual follows the rule will be small in such scenario where a sufficient proportion of the population of reference is not conforming to the norm in spite of the, more or less, generalized normative support. In that case, condom use will not strongly conflict with the fidelity norm and will be more likely to take place, *ceteris paribus*.

As regards reproduction, the clash between condom use and the social norm that makes wives and husbands understand the production of offspring as one of their main duties should have less relevance the more children the couple already has. It is not only that spouses are likelier to agree upon using condoms when they do not need to renounce reproduction, but marital discussions about condom use may also come up more easily when the spouses agree on an alternative interpretation of this practice, that is to say, by understanding it as a contraceptive, rather than a disease-prevention, method. Even if the intention to use condoms responds to protect against infection, husbands and wives may feel more comfortable suggesting this practice as a family planning method. In these analyses I attempt to capture the elements of this argument using measures of suspicion of spousal unfaithfulness, the perceived extent of extramarital sex in one's social network, and the relevance of parenthood within marriage.

On methodological grounds, the ideal research strategy to investigate condom use is to collect and analyze jointly information from both husband and wife. Most studies about preventive sexual behavior, as about many other topics, conduct separate analyses for women and men.[5] This approach has severe limitations, since the outcome to be explained is not a strictly

[5] An exception is Zulu and Chepngeno (2003).

individual behavior. Moreover, the same person may use condoms with one particular sexual partner but not with another. Couple-based analyses, on the other hand, offer more comprehensive and realistic models, since they take into consideration information about both of the parties involved in the act of using, or not using, condoms. Nevertheless, this approach becomes problematic when it comes to constructing indicators referring to the couple's behavior since the researcher must decide how to deal with the inevitable husband-wife discrepancies in the reporting of practices such as condom use within marriage.

Almost no effort has been made in the literature to identify important causes of discrepancies or biased responses (Miller *et al.*, 2001; Harvey *et al.*, 2004)[6]. In this chapter I develop a couple-based explanatory model of condom use within marriage that identifies and takes into consideration the factors that bias individuals' reports of condom use. To this end latent class analysis (LCA) is used (McCutcheon, 1987; Hagenaars and McCutcheon, 2002), which 'models the relationships between sets of categorical or ordinal variables as arising from the common influence of an unobserved, latent variable, having two or more categories or classes' (Breen, 2000: 375). In this case the latent, unobserved variable is the "true" use of condoms by the couple, and the manifest variables are the husband's and wife's responses to the question of whether they use condoms within marriage, plus other variables that explain preventive sexual behavior and/or bias the report of condom use. In other words, a measurement model and a structural model are estimated simultaneously. The former attempts to uncover the "true" degree of condom use in marriage, while the latter attempts to assess the effect of a set of explanatory variables on this "true" response.

This methodological strategy has two main advantages for this study. On the one hand, a couple-level analysis of preventive

[6] Some other studies have examined differences between partners in reports of contraceptive use and intentions (Ezeh *et al.*, 1996; Becker, 1999; Ezeh, 2000).

sexual behavior can be carried out and, on the other hand, the biasing effect of certain factors on the report of condom use can be explored. This is because the manifest response to the question of condom use given by a man or woman may be a function not only of what the couple truly does but also of other factors which may induce individual respondents not to tell the truth to the interviewer. It is easy to imagine how useful an understanding of these factors would be in improving our knowledge about effective policies to encourage preventive behavior against AIDS.

I hypothesize that those individuals who have been informed, by health assistants or other experts, about AIDS and the ways to prevent infection are more likely to over-report condom use during an interview even though they may not be more likely to use condoms. If this proves to be so then some of what appears to be a positive influence of expert information on individual preventive behavior may derive, at least in part, from the fact that having received such information induces people to give exaggerated reports of their preventive practices.

In sum, the aim of this research is to understand the levels of condom use within marital relations in Malawi from a micro perspective, taking into consideration the effect of factors that may bias individuals' responses about preventive sexual behavior. In the next section of the chapter details about the sample are presented and some relevant characteristics of the Malawian context on which the research focuses are reviewed. The research problem is specified in Section 6.4 and the statistical method in Section 6.5. The empirical analysis is summarized and explained in Section 6.6 followed by a concluding section.

6.3. Data and context

The data come from the Malawi Diffusion and Ideational Change Project (MDICP). The analyses in this chapter are applied to the data from the last two waves (2004 and 2006), since these are the only ones that provide specific information about condom

use within marriage. The data for one of the years is analyzed and then the analyses are replicated using the other wave to test the robustness of the results. There is considerable overlap between the 2004 and 2006 samples but they are not identical because some of the couples are not present in both waves.

Since one aim of this research is to show the importance of taking couples as units of analysis in the study of preventive sexual behavior, the sample is limited to those individuals whose spouse has also been interviewed.[7]Only monogamous couples are analyzed because it is not possible to know, in the case of polygamous families, to which of the current wives the man's responses about condom use inside marriage refer.[8] Furthermore, women's evaluation of the HIV risk that unprotected marital sex involves would be more complex in polygamous couples, possibly requiring a differently specified model.

Malawi has a mature epidemic with an HIV prevalence among adults that exceeds 12% (UNAIDS and WHO, 2009), and an estimated rural prevalence of 10.8% (Malawi DHS 2004). Malawi exemplifies the problems in the region, since it is similar to other sub-Saharan countries and to countries classed in the World Bank low income group in terms of life expectancy, educational enrollment, infant mortality, and other indicators (World Bank, 2006). Subsistence agriculture characterizes all three regions of Malawi –north, center and south– but there are differences among them in terms of marriage system, ethnic composition, and socioeconomic conditions. The north has higher levels of education and wealth, and follows a patrilineal system of inheritance in which residence after marriage is patrilocal. In the center and south the marriage system is matrilineal and matrilocal although this is less strict in the central district, where residence

[7] The datasets allow us to link each individual to his or her current spouse. Other possible sexual partners were not interviewed. In the majority of the analyzed couples, husband and wife were interviewed on the same day and separately.

[8] Men in polygamous marriages constitute less than 20% of both samples.

may be either matrilocal or patrilocal.[9] The differences between these two types of kinship ties have been considered as determinants of women's autonomy and social integration (Helleringer and Kohler, 2005; Takyi and Broughton, 2006; Takyi and Gyimah, 2007; Reniers, 2008), and, indirectly, of HIV preventive behavior.

The Malawian rural population is quite aware of the HIV/AIDS epidemic and how HIV is transmitted: more than 70% and 85% of sexually active women and men, respectively, identify abstaining from sex as a way to avoid HIV infection and almost 60% and 68% of these women and men report that AIDS can be avoided by using condoms during sex (DHS 2004). Low levels of condom use outside and inside marriage do not, therefore, seem to be related to a lack of knowledge about the disease. Moreover, if anything, rural Malawians tend to overestimate the probability of becoming infected through a single act of sexual intercourse with a person who has the virus (Smith and Watkins, 2005). Even in marital relations, the perception of lower risk does not seem to be the main factor that explains the absence of condom use, given that around 70% and 65% of married women and men are worried about becoming infected (MDICP 2004).

Multiple studies have highlighted the relevance of the social environment for the adoption of preventive practices in sub-Saharan Africa, as in other regions (Rushing, 1995; Caldwell, 1999; Gausset, 2001; Rutenberg *et al.*, 2001; Dolcini *et al.*, 2004). Experimental and empirical analyses have emphasized both the negative and positive influence of peers on risk assessments and risky behavior (Campbell and MacPheil, 2002; Hughes-D'Aeth, 2002; Scherer and Cho, 2003). Numerous authors have treated the spread of modern contraceptive methods as a diffusion process (Montgomery and Casterline, 1996; Kohler, 2001), and some

[9] In a patrilineal/patrilocal system offspring are part of the man's kinship group. Polygyny is a common practice in this system. In a matrilineal/matrilocal system, inheritance of offspring, property, and family resources is through the mother's brother.

recent studies investigate the role of social networks in HIV preventive attitudes and behavior (Helleringer and Kohler, 2005; Kohler *et al.*, 2007).

The social acceptance of condom use is far from being widespread. Although the dramatic levels of HIV prevalence have forced Government agencies and NGOs to promote condom use, public programs and policies tend to associate condom use with risky sex outside marriage, and especially commercial sex (Chimbiri, 2007). However, a significant part of the population reports having had some informal conversations about AIDS in which condom use has been considered by some of the interlocutors to be a good strategy against AIDS (Bühler and Kohler, 2003). The percentage of people who say that condom use within marriage is acceptable to protect against HIV infection has increased between 1998 and 2004, especially among women (from 15% in 1998 to 42% in 2004) (Tavory and Swidler, 2009).

As some authors have pointed out, the spread of condom use inside marriage may be hindered by established social norms that regulate marital relations (Caldwell, 2000; Watkins, 2004). One of the main norms in marriage is fidelity. To propose the use of condoms thus amounts to breaking this norm since it is either an admission that one has not been faithful or that one believes that the other has not been faithful (Smith, 2006; Tavory and Swidler, 2009). However, since extramarital sexual relations are quite frequent among married men in Malawi, it could be that the fidelity norm does not exert a strong pressure on certain individuals or groups, in the sense that these people do not expect a relevant proportion of the population to follow the rule, even when believing that this is the way an individual should behave (Bicchieri, 2006). Extramarital sex among married women is not infrequent, but it is far from being socially accepted or even socially tolerated, so I do not expect that this rule has normatively weakened. This leads me to the hypothesis that the spread of unfaithfulness in the husband's social network has some effect on the married couple's preventive behavior. Condom use within

marriage is expected to be more likely when the man's married friends are perceived as unfaithful.

The other fundamental social norm that regulates marital relations is the intimate link between marriage and parenthood. Wives and husbands in Malawi and other sub-Saharan countries are expected to provide their spouses with children. Marriage is understood as the institutional frame in which legitimate sex and children are embedded (Caldwell, 2000; Watkins, 2004; Chimbiri, 2007) and some Malawians believe that marriage is motivated by the intention to have children (Sultana *et al.*, 1990[10]). Therefore, the use of condoms as a preventive strategy against HIV/AIDS in marital relations can only make sense when the couple already has children. The twofold function of condoms, as contraceptive and as protection against infection, is expected to hinder their use when the couple has no children, but may facilitate it once they have, since the contraceptive function allows couples to reinterpret condom use in a way that does not conflict with faithfulness and trust. Condom use should therefore be more common when both husband and wife agree on stopping or spacing births. Conversely childlessness should have a negative influence on condom use inside marriage. In this case, the personal expectations about this norm cannot be measured, but the analysis focuses on the number of living children.

6.4. The methodological challenge

Research studies about sexual behavior and contraceptive use have conventionally focused on individuals, attempting to observe the effect that personal characteristics and, sometimes, interpersonal interactions, have on individual actions. Women's responses have been considered the most useful in the analysis of contraceptive use in less developed countries, although demographers have long noticed spousal discrepancies in surveys

[10] Cited in Chimbiri 2007.

(Koenig *et al.*, 1984). Even when the responses of both men and women are taken into consideration, analyses are usually carried out separately by sex. This approach implicitly assumes that the phenomena of interest are individual actions that may be influenced by one's own and other people's actions and attitudes. However, sexual behavior and even contraceptive use are difficult to conceive of as purely individual actions. There have been few attempts to explain the relevance of the kind of sexual relationship and the interaction between the sexual partners to preventive sexual behavior: the 'interactional framework' is one such attempt (Van Campenhoudt and Cohen, 1997). Nevertheless, it is difficult to find empirical couple-based analyses of preventive sexual behavior (Zulu and Chepngeno, 2003) and there are very few studies that compare wife's and husband's responses to issues related to HIV prevention (Miller *et al.*, 2001; Anglewicz *et al.*, 2010).

The use of couples as units of analysis may improve the explanation of condom use as an HIV preventive practice. It is not enough to focus on specific sexual relationships; we should also pay attention to the responses of both partners to questions concerning individual characteristics or actions and couple behavior. On the one hand, researchers may be interested in the attitudes, expectations, and perceptions of both actors involved, and the best source of information is, in principle, each person's report. On the other hand, we should take advantage of having two statements referring to the same outcome. Ideally, husband's and wife's reports about having used condoms with their spouse should be very similar, and the differences would be exclusively due to non-systematic errors. In that case, either response could be taken as a measure of the couple's practice. However, husband-wife discrepancies may be observed, even when the quality of the surveys is high. This is exactly the case in the Malawian data.

Table 6.1 shows that in both 2004 and 2006 the percentage of husbands who report that they use condoms[11] with their current spouse is higher than the same figure for wives. These results could derive from a general tendency for men to give positive answers more often than women. Miller *et al.* (2001) also observed this pattern in the 1998 wave of the MDICP, although rather than condom use they analyzed several other issues including 'having ever talked with the spouse about the risk of getting AIDS'. The difference in husband's and wives' responses is statistically significant ($p < .0001$) in both years.

The number of missing cases in both wives and husbands' responses is quite high in 2004 because people who reported that they had not had sex with their spouse in the last 12 months were not asked about condom use with their spouse. Thus, the category of missing cases in the discrepancies variable involves couples in which at least one of the spouses is a missing case. Curiously, however, in most of these missing couples, the other spouse reported that they had had sex, so discrepancies are present even in these cases. In 2006, this problem does not occur because every individual had to answer the question about condom use, independently of whether the couple had sex in the last year or not[12]. All the missing cases are eliminated from the subsequent analyses.[13]

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[11] Unfortunately, the MDICP surveys do not ask about condom use at the last sexual intercourse with a specific type of partner, which is usually considered the best indicator of condom use, because it is less susceptible to memory and other biases than are questions about the frequency with which condoms were ever used. For details of the construction of the indicator of condom use, see the Appendix 6.1.

[12] It should be noted, however, that the percentage of women and men who reported not having had sex in the last year was minuscule in 2006.

[13] A model that included the missing cases as a third category was also tested with the 2004 data, since sexual abstinence in marriage could itself be an HIV preventive strategy. The model was rejected because the

Table 6.1. Distribution of condom use inside marriage according to wives and husbands, and distribution of discrepancies between the spouses (N = 643 in 2004 and N = 627 in 2006)

	2004			2006		
	Wives	**Husbands**	**Couple**	**Wives**	**Husbands**	**Couple**
Condom use with current spouse						
No	79.6	76.7		81.5	77.5	
Yes	10.1	16.3		17.7	21.5	
Missing	10.3	7.0		0.8	1.0	
Total	100.0	100.0		100.0	100.0	
Discrepancies on condom use in marriage						
Both say yes			5.1			7.2
Wife says yes, husband says no			4.7			10.4
Husband says yes, wife says no			9.3			13.9
Both say no			65.5			67.9
Missing			15.4			0.6
Total			100.0			100.0

Note: Descriptives are based on the total samples of monogamous married couples, including missing cases.

In both years the percentage of couples whose members report opposite answers is more than double the percentage of couples in which husband and wife agree that they use condoms. Thus one should be cautious when selecting the source of information about condom use inside marriage. In this study, one characteristic that may induce people to misreport condom use inside marriage is identified, and this information is used to obtain a more reliable measure.

Analyses of survey data frequently assume that the characteristics of the interviewer and the situation in which the

estimated coefficients had very large standard errors as a consequence of the small size of the category.

interview takes place have no systematic impact on the likelihood that the respondent gives truthful answers. However, in reality the survey situation may play an important role on the quality of the information obtained (Fowler, 1993) and this is particularly likely when the topics that are discussed are sensitive, controversial, and private (Huygens *et al.*, 1996). Miller *et al.*, (2001: 170) argue that respondents give the answers that they think can benefit themselves or their community in the light of what they believe the interviewer's research aims to be. This explanation seems to assume an instrumental and conscious reaction by the respondent and I consider, instead, the possibility that a respondent's beliefs about what the interviewer and the people "like" her/him expect shapes the answer that is given. In other words, people provide a response about their behavior coherent with what they believe is a socially desirable behavior (Crowne and Marlowe, 1960; Phillips and Clancy, 1972; DeMaio, 1984; Kissinger *et al.*, 1999; Gregson *et al.*, 2002). The formation of these beliefs is mainly derived from the comparison that the respondent makes between the particular situation in which the interview takes place and previous experiences with similar characteristics that he/she remembers (Lamberts and Shanks, 1997). I therefore expect that those individuals who report that someone like a Community-Based Distribution Agent, a Traditional Birth Attendant, or a Health Surveillance Assistant[14] ever came to their home to give them information about how people can protect themselves against AIDS will tend to overreport condom use. Huygens *et al.*, (1996: 225) report that, in Uganda, 'local farmers and teachers trained as interviewers in the programme were soon viewed as members of the pool of researchers known as "doctor" or "virus" in the community. […] This attitude may influence the respondent to

[14] These are all local workers who have been trained by the government or NGOs for various purposes related to family planning, health promotion, and reproduction assistance. In 2004, 26% of the wives and 32% of the husbands in the sample report that a person with such characteristics came to their home to give them information. In 2006, the percentages increase to 48% and 46% respectively.

hide his or her own beliefs and behaviors in assuming that the interviewer is more educated or sophisticated'. Therefore, it makes sense to think that those respondents in the MDICP surveys who have been informed about HIV/AIDS preventive practices by these local "experts" are likely to associate that experience with the interview, where they are asked by mostly local interviewers about sexual behavior, AIDS, and condom use, among other things. Clearly AIDS information from experts may also affect actual condom use and these analyses seek to measure both the potential biasing effect on the report of condom use and the effect on condom use itself.

6.5. The approach: Latent Class Analysis

Loglinear models with latent variables are used in this study to estimate a measurement model and a structural model for condom use. The measurement model links a latent unobserved true response concerning condom use in marriage to the manifest responses of the husband and wife to the question concerning condom use in marriage. I use the measurement model and structural models to examine how characteristics of couples are related to true condom use, and how the true response relates to their manifest responses (the results are in Tables 6.2 and 6.3). In addition, in the measurement model, the relationship between the manifest and latent responses of the husband and wife varies according to one factor that is expected to induce individuals to misreport condom use inside marriage. The estimation of the whole model enables us, then, to both understand the mechanism that explains true condom use and identify some of the reasons behind husband-wife discrepancies in reporting their preventive behavior.

Loglinear analysis of models with asymmetrical order of the variables is based on natural logarithms of the conditional odds of being in one category of the dependent variable instead of on another one (Hagenaars, 1993). Maximum likelihood estimates of

the latent class models are obtained through an iterative estimation process.

The final analysis is a comparison of the results of the latent class analysis with alternative models which use the same set of explanatory variables. On the one hand, a model is estimated in which the reported condom use by one of the partners is taken as the dependent variable. The intention is to illustrate the advantages of using this approach, which removes the necessity of choosing one of the spouse's responses as the truthful one. On the other hand, a multinomial logit for the four possible combinations of husband and wife's responses is estimated and the comparison shows that the latent class model that is proposed is superior in terms of goodness of fit to the same data.

It should be noted that the LCA requires all the variables in the model to be categorical. The relatively small sizes at my disposal force me to make a number of simplifications to the analysis. I mainly use dichotomous variables, although I am aware of the resulting loss in explanatory power. Moreover, I am sometimes obliged to use the response of one or other spouse to construct the explanatory variable that measures a couple characteristic. This is the case, for example, with location of residence, which may be matrilocal or patrilocal. Both the husband and the wife were asked about this topic but I use the latter's response (though in this case there are few discrepancies).

6.6. Results

Figure 6.1 shows the structural and measurement models and Tables 6.2 and 6.3 report the maximum likelihood estimates of its parameters in the 2004 and 2006 data, which have been obtained using the LEM software. Models 1 and 2 in Tables 6.2 and 6.3 refer to the latent class analysis. In the measurement model, the latent true response generates the observed responses of husband and wife. In the structural model I focus on how couple level characteristics predict latent or true condom use.

Figure 6.1. Measurement and structural model

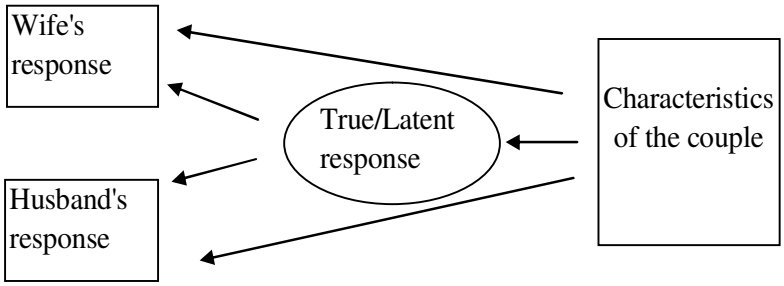

Table 6.2. LCA of condom use within marriage, 2004 (N= 476)

		Model 1		Model 2	
	N	***B***	***SE B***	***B***	***SE B***
Measurement Model					
Dependent variable: Reported condom use (wife/husband)					
Actual condom use (latent) → wife's report		4.86***	1.192		
Actual condom use (latent) → husband's report		2.45***	0.424		
Actual condom use (latent) → wife's or husband's				3.43***	0.347
Informed by experts about AIDS (wife/husband)				0.84**	0.340
Structural Model					
Dependent variable: Actual condom use (latent)					
Both spouses attended school	301	1.09***	0.512	0.99***	0.506
Wife's age (ref.: *15-25*)					
26-35	185	-0.04	0.459	-0.25	0.486
36+	184	-1.03**	0.549	-1.19***	0.554
Matrilocal residence	161	-1.16**	0.501	-1.09**	0.509
At least one spouse suspects of infidelity	177	0.27	0.362	0.26	0.378
More than two living children	476	1.12**	0.513	1.41**	0.546
At least half of the network partners had extramarital sex	67	0.15	0.509	0.46	0.477
Wife informed by experts about AIDS	120	0.63	0.388	0.23	0.449
Husband informed by experts about AIDS	147	-0.65	0.456	-1.12**	0.549
L^2			287.0		285.1
BIC			-6729.2		-6731.1
df			1138		1138

*** pvalue < 0.01 ** pvalue < 0.05 * pvalue < 0.10

Table 6.3. LCA of condom use within marriage, 2006 (N = 548)

		Model 1		Model 2	
	N	***B***	***SE B***	***B***	***SE B***
Measurement Model					
Dependent variable: Reported condom use (wife/husband)					
Actual condom use (latent)		2.39***	0.318	2.68***	0.337
Informed by experts about AIDS (wife/husband)				1.00***	0.260
Structural Model					
Dependent variable: Actual condom use (latent)					
Both spouses attended school	321	0.92	0.568	0.97*	0.512
Wife's age (ref.: *15-25*)					
26-35	203	-2.15**	0.996	-2.03***	0.779
36+	247	-3.82***	1.134	-3.75***	0.952
Matrilocal residence	190	-1.35	0.946	-1.05	0.676
At least one spouse suspects of infidelity	131	1.40**	0.634	0.96*	0.537
More than one living children	475	1.42	0.981	1.42*	0.833
At least half of the network partners had extramarital sex	102	-0.21	0.781	-0.42	0.657
Wife informed by experts about AIDS	269	0.57	0.509	-0.23	0.461
Husband informed by experts about AIDS	269	0.08	0.465	-0.65	0.453
L^2			402.2		384.8
BIC			-6780.7		-6791.8
df			1139		1138

*** pvalue < 0.01 ** pvalue < 0.05 * pvalue < 0.10

6.6.1. Latent Class Analysis

Two latent classes models are fitted to each year's data: these two models differ only in their specification of the measurement model. In the first, I estimate a model with a restricted measurement part where the husband and wife's manifest responses are exclusively generated by the true latent variable (Model 1). In the second the manifest responses of husband and wife are allowed to depend also on whether or not they have been informed about AIDS by experts (Model 2). Fitting these two different versions of the measurement model then allows us to observe how the estimated effects of the explanatory variables on true condom use shift when factors that may induce women and men to misreport protected sex inside marriage are taken into account. In the structural model three variables are included to test the hypotheses about the determinants of condom use in marriage. These are the perception of HIV risk derived from extramarital relations (a dichotomous indicator that distinguishes those couples in which at least one of the spouses suspects the other of infidelity); the number of living children (distinguishing zero or one from more than one); and the proportion of the husband's network partners that are (or are suspected to be) unfaithful. I also incorporate two variables indicating whether the husband and wife, respectively, have been informed by experts about AIDS and the ways to prevent it.[15] In addition, the wife's age, the couple's education, and the place of residence are included as control variables.

The measurement model may be written as a logit model:

$$\mathbf{logit}\left[\frac{Y_i = yes}{Y_i = no}\right] = \beta_{0s}[\eta = yes] + \beta_{1s}[X_i = yes],$$

[15] See the Appendix 6.1 for details about the construction of all the variables in the models.

where i denotes individual observations and s denotes sex, Y is the manifest response to the condom use question (denoted W and H in Tables 6.2 and 6.3) and X is the variable measuring whether or not the individual has been informed by experts about AIDS. The latent response is denoted by η .

In the first version of the measurement model I set β_{1s}=0 and thus focus only on the relationship between the latent and manifest responses. A chi-squared test of the hypothesis that β_0 does not differ by sex cannot be rejected in the 2006 data, and so in Table 6.3, Model 1 reports a single coefficient. This is not the case for the 2004 data and so in Table 6.2, Model 1, I report the sex-specific coefficients which suggest that women's manifest response is more closely linked to the true response than is men's.

In the second version of the measurement model (Model 2 in Tables 6.2 and 6.3) both coefficients are estimated, but now, in both years' data, both coefficients can be constrained to be the same for men and women (chi-square of 1.55 in 2004, 0.12 in 2006, both with 2 df). The β_1 coefficient is positive and statistically significant, indicating that having been informed by experts increases the odds of a positive manifest response by a factor of 2.3 times in 2004 (= exp(0.837)) and 2.7 times in 2006 (=exp(1.004)).

Turning to the structural model, which predicts the log odds of being in the 'yes' category of the latent response, as expected, the probability of using condoms decreases with the wife's age, although in 2004 this effect is weaker and only the highest category is statistically significant. As regards education, the indicator differentiates those couples in which both husband and wife have attended school from the rest. The influence of education is positive and substantial in both years, especially in 2006. The type of marriage and residence system has a negative effect on condom use, only statistically significant in 2004.

I then include the explanatory variables to test the hypotheses discussed earlier. The perception of HIV risk derived from extramarital relations has a positive and significant effect in 2006, but the coefficient does not reach the significance threshold in

2004. As expected, having no or one children (two or less in 2004) reduces the likelihood that a couple uses condoms.[16] I interpret this to mean that the use of condoms increases when couples are willing to use contraceptive methods for birth stopping or birth spacing purposes– that is, once that they have children. This does not necessarily mean that the only reason they use condoms is for contraception: couples may also be trying to avoid HIV/AIDS infection, but they are more likely to agree on condom use when it can be interpreted as a way of avoiding pregnancy.

A high proportion of the husband's network partners that are (or suspected to be) unfaithful does not significantly influence the use of condoms by the couple. The results do not seem to support the hypothesis that the weakness of the fidelity norm facilitates condom use inside marriage by reducing the conflict between protected sex and formal sexual relations.

Being informed by experts seems not to make individuals more likely to use condoms with their spouse, but instead induces them to give a positive answer to the survey question. [17] Moreover, in 2004 the husband having been informed by an expert appears to have a negative influence on true condom use by the couple once I allow, in the measurement model, for the effect of having been so informed on the latent response (Model 2 in Table 6.2).

6.6.2. Couple vs. individual measure of condom use

The introduction in the LCA of a factor that systematically biases the reports of condom use has shown one of the advantages of the approach. Now I turn to the advantage of using a measure of

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[16] Since very few women have no living children, the reference category of this variable includes also one (and two in 2004) in order to have an indicator with enough cases in each category. For details, see the Appendix 6.1.

[17] It should be noted that the correlation between the husband and wife's reports on having been informed by experts is very small –the correlation coefficient is close to 0.1 in both waves.

condom use at the couple level, as opposed to the traditional individual-based analyses. Models 3 and 4 in Tables 6.4 and 6.5 consist of a logistic regression analysis in which the dependent variable is derived from the wife's and the husband's reports of condom use, respectively. This allows to see how the results of an analysis might be sensitive to which partner's response is analyzed and how they differ from the findings of the latent class model. As Models 3 and 4 in Tables 6.4 and 6.5 show, results from the analysis of condom use inside marriage vary depending on which spouse's response is considered. Some variables that seem to be relevant when studying condom use according to women's reports are not significant at all when the men's reports are analyzed. In Model 3 in Table 6.4, which uses the wife's response, the level of education in the couple, the wife's age, and whether the wife received expert information about AIDS all affect the likelihood of using condoms. In contrast, the relevant variables in Model 4, which uses the husband's response, are the wife's age, the suspicion of infidelity by at least one of the spouses, the number of living children, and the husband having received expert information about AIDS. Differences between Models 3 and 4 in Table 6.5 are also large. The sample is not exactly the same in Models 3 and 4 because the missing cases in the spouse's report of condom use are not eliminated. Even if the same sample is used in both models (by eliminating all missing cases) similar differences in the relevance of the variables are observed.[18]

[18] Results are available upon request.

Table 6.4. Multivariate logit regression models of condom use according to wives and husbands, 2004 (N_1 = 507 wives and N_2 = 519 husbands)

	N_1	Model 3 Wife		N_2	Model 4 Husband	
		B	***SE B***		***B***	***SE B***
Both spouses attended school	322	0.60*	0.346	328	0.40	0.264
Wife's age (ref.: *15-25*)						
26-35	197	-0.08	0.369	197	-0.38	0.311
36+	199	-0.82*	0.418	207	-0.74**	0.330
Matrilocal residence	170	-0.68*	0.366	172	-0.23	0.269
At least one spouse suspects of infidelity	185	0.24	0.291	190	0.06	0.241
More than two living children	394	0.82**	0.411	402	0.87***	0.336
At least half of the network partners had extramarital sex	71	-0.06	0.418	72	0.50	0.312
Wife informed by experts about AIDS	127	0.52*	0.308	130	0.23	0.261
Husband informed by experts about AIDS	157	-0.28	0.323	164	0.16	0.250

*** pvalue < 0.01 ** pvalue < 0.05 * pvalue < 0.10

A common finding in the analysis of both waves that should be highlighted is that the variable indicating whether the person has received information from experts is positively related to self-reported condom use, whereas it is never a relevant factor when the spouse's response is taken as the dependent variable. This is less clear in the case of men because this variable is not statistically significant in Model 4 in 2004. Using individuals' reports with a traditional multivariate logistic regression would thus suggest that spreading AIDS information through the rural population by interpersonal communication between people and local experts on health is an effective preventive policy strategy.

But that conclusion is not supported when using the couple-based analysis that I propose.

Table 6.5. Multivariate logit regression models of condom use according to wives and husbands, 2006 (N_1 = 552 wives and N_2 = 553 husbands)

		Model 3			Model 4	
	N	Wife		N	Husband	
		B	***SE B***		***B***	***SE B***
Both spouses attended school	323	0.59**	0.269	323	0.32	0.238
Wife's age (ref.: *15-25*)						
26-35	205	-0.63*	0.334	205	-1.00***	0.319
36+	249	-1.39***	0.356	250	-1.64***	0.332
Matrilocal residence	191	-0.39	0.281	192	-0.26	0.250
At least one spouse suspects of infidelity	133	0.33	0.265	132	0.56**	0.242
More than one living children	479	0.27	0.380	480	0.81**	0.375
At least half of the network partners had extramarital sex	102	-0.01	0.308	102	-0.24	0.290
Wife informed by experts about AIDS	273	0.73***	0.243	272	-0.01	0.217
Husband informed by experts about AIDS	269	-0.32	0.239	271	0.51**	0.220

*** pvalue < 0.01 ** pvalue < 0.05 * pvalue < 0.10

6.6.3. An alternative approach to couple behavior

Finally, the proposed model is compared with an alternative which, unlike the models for a single partner's response, is applied to exactly the same data sets as the latent class model. Since the

latent class model embodies a hypothesis about how the data are generated, albeit one which posits an unobserved variable, it is important to ask whether this hypothesis provides a better account of the data than others, and, in particular, others which do not invoke any unobserved constructs. The simplest such model is a multinomial logit in which the two sets of responses of the spouses are used to form four possible response categories: both say Yes, both say No, and two categories in which the partners provide discrepant answers. In this analysis 'both say No' is used as the reference category.

As Tables 6.6 and 6.7 show, the multinomial model returns a slightly lower L^2 value than both latent class models (reported in Tables 6.2 and 6.3) for both 2004 and 2006 but fits more parameters. Under the assumption that the multinomial and latent class models are nested, a test of the difference in their deviances can be carried out. Taking the first latent class model as the comparison, the difference in goodness of fit between this and the multinomial model is 14.97 with 16 df in the 2004 data and 24.38 with 17 df in the 2006 data. So in neither case is the more parsimonious latent class model a poorer fit to the data than the multinomial model. Making the comparison using the second latent class model (which includes the effect on the latent variable of being informed by experts about AIDS) returns the same result – of necessity since this model is preferred to the simpler latent class model.

Using the BIC statistic to compare the models (which does not require that the models are nested) yields the same conclusion: BIC always prefers the latent class model to the multinomial. The BIC values for the former are -6729 and -6781 in 2004 and 2006 respectively; while for the multinomial they are -6646 and -6698.

Table 6.6. Multinomial logit regression of the reported use of condoms by husband and wife, 2004 (N = 476). Reference category: both spouses say they do not use condoms

	Wife says Yes, Husband says No		**Husband says Yes, Wife says No**		**Both say Yes**	
	B	***SE***	***B***	***SE***	***B***	***SE***
Both spouses attended school	0.61	0.497	0.14	0.319	0.92*	0.524
Wife's age (ref.: *15-25*)						
26-35	0.59	0.610	-0.21	0.411	-0.42	0.488
36+	-0.20	0.665	-0.3	0.414	-1.23**	0.584
Matrilocal residence	-1.07*	0.574	-0.17	0.327	-0.76	0.525
At least one spouse suspects of infidelity	0.12	0.420	-0.01	0.307	0.43	0.401
More than one living children	1.10*	0.659	1.19**	0.474	0.81	0.530
At least half of the network partners had extramarital sex	-1.37	1.040	0.31	0.408	0.36	0.504
Wife informed by experts about AIDS	0.61	0.432	-0.01	0.342	0.46	0.437
Husband informed by experts about AIDS	-0.170	0.455	0.42	0.309	-0.57	0.490
L^2					272.04	
BIC					-6646	
df					1122	

*** pvalue < 0.01 ** pvalue < 0.05 * pvalue < 0.10

Table 6.7. Multinomial logit regression of the reported use of condoms by husband and wife, 2006 (N = 548). Reference category: both spouses say they do not use condoms

	Wife says Yes, Husband says No		**Husband says Yes, Wife says No**		**Both say Yes**	
	B	***SE***	***B***	***SE***	***B***	***SE***
Both spouses attended school	0.56*	0.332	0.32	0.280	0.81*	0.433
Wife's age (ref.: *15-25*)						
26-35	-0.33	0.455	-0.87**	0.389	-1.47***	0.465
36+	-0.97**	0.466	-1.46***	0.398	-2.65***	0.548
Matrilocal residence	0.00	0.333	0.04	0.286	-1.12**	0.516
At least one spouse suspects of infidelity	0.20	0.345	0.52*	0.289	0.65*	0.389
More than one living children	-0.06	0.463	0.66	0.442	1.10*	0.597
At least half of the network partners had extramarital sex	0.34	0.363	0.05	0.331	-0.62	0.531
Wife informed by experts about AIDS	0.83***	0.310	-0.12	0.260	0.53	0.360
Husband informed by experts about AIDS	-0.40	0.307	0.67**	0.266	0.08	0.357
L^2					377.82	
BIC					-6698	
df					1122	

*** pvalue < 0.01 ** pvalue < 0.05 * pvalue < 0.10

As regards the estimated effects in the multinomial model, when comparing the likelihood of a positive response from both spouses as opposed to a negative response from the two of them, the absolute value of the estimated coefficients is different than in the latent class model, but the signs are the same. It should also be noted that, in 2006, a spouse having been informed by experts about AIDS makes a significant difference only to the log odds that that person reports that the couple had used condoms. In 2004, the significance of these variables is lower, but the tendency is similar.

6.7. Conclusions

Before summarizing the conclusions I should point to some limitations of our analysis that future research might seek to address. These mostly stem from the fact that the link between concepts and their indicators is sometimes not as close as one could wish. In particular, the question about condom use in marriage would have been better, for our purposes, had it focused on the most recent sexual intercourse. Similarly, I was forced to use the number of surviving children as a proxy for the couple's future fertility and family planning preferences when a direct measure would have been preferable. One consequence of such limitations is that they introduce error into our estimates which is most likely to lead the anlysis to underestimate the strength of the relationships between condom use and the explanatory variables. The relatively small sample sizes available also impose a limitation on the ability to discern effects which may have been more readily apparent with a larger sample.

In this chapter latent class analysis has been used to deal with husband-wife discrepancies in reports of condom use in marriage. This approach offers two advantages over more conventional ones. First, it is possible to estimate a measure of condom use at the couple, rather than individual, level. Condom use is never a strictly individual outcome: sexual behavior is affected by the

context in which it takes place and by the attitudes and characteristics of the individuals involved, and the social norms that regulate different types of sexual relations are diverse. The advantages of the latent class analysis in comparison with traditional approaches become evident when it is observed that conclusions about the factors affecting condom use depend on which spouse's responses are considered. Secondly, the LCA sheds light on why discrepancies between the husband's and wife's responses about condom use are observed. I have been able to explore the factors that induce men and women to lie or tell the truth in response to survey questions about their preventive behavior. There are obvious possibilities to apply this approach to other circumstances in which two or more respondents are asked factual questions about activities they have engaged in together.

One of the main objectives of this study was to test the hypothesis that condom use within marriage is in conflict with the most salient social norms that regulate marital relations in rural Malawi. Fidelity and reproduction are two of the fundamental elements that guide spouses' behavior, and are hardly compatible with the use of condoms, which, my analysis showed, is usually motivated by the suspicion of unfaithfulness. However, the pressure that social norms exert on individuals and couples might depend on the expectations that they have about the extent to which others follow the norms. Besides, the compliance with the norm that links marriage with reproduction is more evident as the number of children increases. So, the use of condoms in marital relations should be less problematic as the family reaches an acceptable size. The empirical analysis in this research supports the part of the argument concerning reproduction. Nevertheless, I have not found evidence to support the proposition concerning the relevance of the others' compliance with the social norm of fidelity. This does not necessarily mean that condom use within marriage is not influenced by the norm of fidelity, but it does not support the hypothesis that empirical expectations about fidelity affect condom use, despite the norm being generally accepted. It could be that, even if people perceive that the norm is disobeyed

by many others, the normative expectations might be so relevant that condom use for HIV-prevention purposes is very unlikely to have a place in marital sex. If that is the case, and given the relevance of the number of children in the couple's likelihood of using condoms, the best strategy for promoting condom use would be to emphasize its contraceptive function rather than the HIV-protection one. The interpretation of condom use as a contraceptive method should help to diffuse this practice among married couples that are willing to stop or space births.

On the other hand, I have identified a factor that partially explains the deviations of the responses that women and men give about condom use within marriage from the 'true' couple preventive behavior. Those individuals who report that a local expert has ever been to their homes to inform them about AIDS preventive behavior are more prone to exaggerate, in their responses, their use of condoms within marriage. Possibly because respondents associate that experience and the interview, they report a behavior they believe they are expected to have adopted. The results show that failing to take account of this may lead to the erroneous conclusion that being informed by experts about AIDS prevention actually induces couples to use condoms. This finding should not be interpreted as evidence of the failure of prevention programs that spread AIDS information through the rural population since they might have a positive effect on other preventive practices. However, we should be cautious when evaluating the success of policy interventions, and be sensitive to the bias that may be present when individuals report their own behavior.

APPENDIX 6.1.

Indicators construction

Condom use:

Men and women are asked whether they have ever used condoms with their current spouse. I have used additional information to construct a dichotomous measure –*users* or *non-users*–that more specifically refers to current condom use. When asked afterwards about the frequency of use, one of the possible answers is 'at the beginning [of the relationship]'. Those who choose that option are considered *non-users*, so that I can be more confident that the appropriate time-order is established. The rest, namely those who say 'sometimes', 'almost every time' and 'every time', are coded as *users*.

Education:

In the 2006 datasets, both women and men's questionnaires include the question about the *respondent's highest level of schooling*. In 2004, women are administered a household roster that includes the question about the highest level of schooling of any person at the household, which has the same categories as in 2006. Thus, the information about the husband's level of education is extracted from the wife's report. The couple-level indicator that I have constructed is a dummy variable taking the value 2 when both husband and wife have attended school and 1 otherwise.

Wife's age:

Women in both waves, 2004 and 2006, have been asked their age. In 2004, another questionnaire was administered to those women who consented to the collection of biomarkers for HIV and other sexually transmitted diseases. Since they were asked about their age again, I have used that information for those who were missing cases in the main survey. A three-category variable

has been constructed in 2004 and 2006, given that all variables have to be categorical in the LCA.

Age is commonly introduced as a control variable in the analyses of contraceptive and condom use (Ali *et al.*, 2001; Feyisetan, 2000; Morris *et al.*, 2000). Controlling for age or cohort effects is, however, more complicated in a couple-level analysis. In our samples of monogamous couples, wife's and husband's ages are highly correlated (0.79 and 0.86 in 2004 and 2006, respectively), which means that the youngest women are usually married to the youngest men, and vice versa.

Matrilocal residence:

Both the husband and the wife are asked: *After you and your spouse got married, where did you live? In your spouse's home or village, in your home or village, or somewhere else?* I have constructed a two-category indicator that distinguishes between those who live in the wife's home or village from the others. Since there are a small number of discrepancies between the husband and wife's responses on this topic, I have used the woman's answer. For the missing cases in 2006 (around 4%), I have taken the husband's report.

Suspicion of infidelity:

Regarding each of the three sexual partners at most that the respondent has had in the last 12 months, she/he answers to the question: *Do you think he/she had other sexual partners during the time you were with him/her?* The datasets specify the type of relationship with each partner, so I use the information about the current spouse. The couple-level dummy variable equals 2 when at least one of the spouses suspects, and 1 when the two of them answer '*No*' or '*Don't know*' to that question.

Living children:

The datasets include information about the number of living children that each individual has. I have constructed a dichotomous indicator that measures the number of living children

reported by the wife, so that those couples that may have an interest on stopping or spacing births can distinguished from those who have no children. Since very few women have zero living children, or even one in 2004, the reference category includes cases with two children or less in 2004 and one or less in 2006 in order to ensure that no category is too small for the statistical inference. Indeed, one or two children represent a very small family size in the rural Malawian context, where the total fertility rate is 6.4 children per woman (DHS 2004).

I have taken the women's reports because this is the source of information that has conventionally been selected as the most reliable in fertility and family planning studies, and because the social pressure for avoiding childlessness may be stronger on women than on men. Female sterility has traditionally been more socially condemned (Isiugo-Abanihe, 1998). In addition, I have focused on the children who are still alive since I consider that the decision about stopping having children is especially dependent on the actual number of descendants, instead of on the amount of births. This is particularly so in societies where the flow of wealth from the younger to the older generation exceeds the reverse flow (Caldwell, 1976; 1982; Clay and Van der Haar, 1993).

Proportion of husband's unfaithful married network partners:

This indicator has been built from several items in the questionnaire. On the one hand, the man is asked: *How about your best male married friend. Has he had sex with anyone other than his wife in the last year?* On the other hand, the respondent also gives information about the sexual behavior of four of the people with whom he has chatted about AIDS. He is asked: a) *How many people other than your spouse have you chatted with about AIDS?* b) *Can you give me the (faked) names of four of these?* c) *Is (each of the network partners) married? d) Is the best friend you talked to me about earlier? e) How many men/women other than her/his spouse do you think she/he has slept with in the last year?* I have calculated a rate where the denominator includes all the married people in the communication network plus the best friend (if the

latter is not one of the network partners), and where the numerator includes those who have been unfaithful, according to the respondent. A dichotomous variable has been constructed afterwards, which equals 2 when 50% of the network partners or more has had extramarital sex, and 1 otherwise.[19]

Since all men who have been interviewed give an answer to the question about the best married friend's extramarital relations, there is information about the spread of unfaithfulness even for those few who have not talked to anybody about AIDS. Although the people with whom men have talked about AIDS could be men or women, more than 85% and 95% of ego's communication networks are formed only by males, in 2004 and 2006 respectively.

Informed by experts on AIDS:

The databases include responses to the question: *Has someone like a CBD Agent, TBA, or a Health Surveillance Assistant ever come to your home to give you information about how people can protect themselves against AIDS?* The constructed indictor separates those who answer 'Yes' from those who say 'No' or 'Don't know'. In this case, the two variables refer to an individual characteristic, because we are interested in estimating its biasing effect on the personal report of condom use within marriage.

[19] Higher thresholds, such as 60%, would generate high standard errors in the estimation of the parameters, especially in 2004 where the number of cases with a high percentage of unfaithful network partners is lower.

CHAPTER 7. CONCLUSIONS

The main objective of this dissertation has been to examine the influence that certain social norms exert through social interactions on married people's HIV-preventive behavior and attitudes in rural contexts in Malawi and Kenya. The results are summarized and compared and contrasted in this chapter, so that a comprehensive overview of the problem may be set out. The main contributions of the research are highlighted, as well as the most significant limitations in the analyses. The last subsection identifies some of the most important implications of the findings for the fight against the HIV/AIDS epidemic in the sub-Saharan context.

7.1. The impact of social interactions on HIV-preventive behavior

Southeastern Africa is the world region most affected by the HIV epidemic. Sexual relations with regular partners account for the greatest share of new HIV infections in these countries (Gelmon *et al.*, 2009; Khobotlo *et al.*, 2009; Mngadi *et al.*, 2009; Wabwire-Mangen *et al.*, 2009). Concurrent sexual relations have been identified as one of the main mechanisms that explain the fast spread of the disease (Morris and Kretzschmar, 1995; 1997). Therefore, it is of crucial importance that we understand the factors that induce married people to adopt HIV-preventive/risk behaviors. The dissertation has focused on two of these practices:

having extramarital sex and the use of condoms within marriage. The samples analyzed come from the *Malawi* and *Kenya Diffusion and Ideational Change Projects* (MDICP and KDICP), which provide two longitudinal surveys that were conducted in rural sites of Malawi and Kenya. These countries share relevant socioeconomic, cultural and epidemiological characteristics with the rest of the countries in the region, so the conclusions in the dissertation might help to understand the same questions facing other populations in southeastern Africa.

In a context where most people affirm that it is not acceptable to have extramarital sexual relations, one could think that the norm of fidelity cannot explain why some married people have sex outside marriage. However, Bicchieri (2006) points out that the existence of a social norm in a society is based on two types of individuals' expectations: normative and empirical. Normative expectations refer to beliefs about the proportion of the others that think one ought to behave according to the rule, and empirical expectations relate to beliefs about the proportion of people who actually conform to the rule. Some level of contradiction between the two types might reduce the strength of the norm as a behavioral guide. Chapter 4 shows that a Malawian married man's likelihood of having extramarital sex clearly depends on his perceptions about the proportion of married people in his social network that has had extramarital partners in the last year.[1] The group seems to encourage extramarital sex when this is perceived as a frequent behavior.

The role of social norms was expected to be especially relevant in small groups where strong ties are common (Granovetter, 1973). Social sanctions are possible in repeated interactions and the desire to please others is more frequent when the person is linked to others through emotional ties. The analysis

[1] The analysis focuses on men's behavior given that few women report extramarital sex and, moreover, several studies have found that men are more likely to be the ones who bring HIV into the partnership (Carpenter et al, 1999; Lurie *et al.*, 2003). Only the Malawi data provides the relevant information for this piece of research.

has supported this idea, since the effect of the proportion of unfaithful partners has been found to be enhanced in dense social networks, where everyone is connected through friendship links. An alternative way of examining whether the effect of social interactions depends on the type of link between the person and her network partners is to distinguish a partner that is closely related to the person from others. Clark (2010) found that the best married friend's extramarital behavior was relevant, whereas the behavior of just a friend or an acquaintance had no effect. In Chapter 4 the best friend's behavior has been compared with the dominant behavior in the social network (without the best friend), since it was expected that individuals consider the whole group as a reference for evaluating the acceptability of a practice. Both variables were statistically significant in the cross-sectional analysis, although they did not reach the significance threshold in the longitudinal one. At this point it must be said that a panel analysis with fixed effects, in addition to a cross-sectional one, has been conducted in order to obtain estimations of causal effects that are not biased by the non-random distribution of social networks among individuals. A third methodological strategy has been used for analyzing the effect of having a best married friend and a network that behave differently to the way the respondent does on the likelihood of changing his extramarital behavior from time t to time $t+1$. Both variables were relevant, but the dominant behavior in the network had a higher impact. Therefore, it seems that, even if certain individuals might exert a special influence, the dominant behavior in the social network is crucial for understanding individuals' extramarital activity.

The use of condoms in marital relations is the other preventive practice analyzed in the dissertation. One of the main hypotheses in this regard has been that the extent to which extramarital sex is tolerated in the society also influences the use of condoms in stable relations such as marital ones. But before explaining condom use within marriage in Chapter 6, it has been considered worth examining what induces married people to have a positive attitude towards this practice. For that reason, Chapter 5 deals with

this issue and focuses on the importance of the meaning of condom use, or in other words, on the way in which it is interpreted. This practice has a twofold function –contraception and prevention. Prevention programs, among other things, have contributed to emphasizing the prevention function at the expense of the contraception purpose. Chapter 5 holds that the negative consequence of this strategy is that condom use is usually associated with risky and 'illicit' sex. Such a connotation leads condom use to conflict with social norms that regulate stable relations. On the other hand, it was expected that individual interpretations of condom use, and therefore, their attitude towards it would be affected by the dominant interpretation and attitude in the group. The analysis shows that having a network in which most people use modern contraceptive methods, especially if these are condoms, increases the likelihood of having a positive attitude toward their use in marital relations, whereas widespread acceptance of condom use with extramarital partners for HIV-preventive purposes does not have a significant influence. The evidence is stronger in the case of men, since the results are also supported by a panel analysis with fixed effects. The hypotheses have been tested with the sample of rural Kenyan married individuals, since one of the crucial questions for the analysis is not included in the Malawi questionnaire. However, the latter offered the possibility of examining the relevance of social interactions when the dependent variable referred to the attitude towards condom use within marriage for a specific purpose: HIV prevention. In the case where the aim is made explicit, a favorable dominant behavior in the network in relation to modern contraception is not very relevant, whereas the network partners' opinions about the acceptability of condom use as a preventive strategy does have a substantial effect. The results are more consistent in the analysis of women. In sum, the acceptance of modern family planning and condom use as a contraceptive method seems to be the crucial social factor for inducing positive attitudes towards this practice in marital relations when the purpose of the use is not revealed. As in the case of extramarital

sex, the social environment is found to be key to understanding people's actions and attitudes.

Finally, Chapter 6 explains the use of condoms by married couples in rural Malawi, the country where information on this matter is available. Couples instead of individuals are taken as units of analysis, which implies an important improvement in the research, as I will explain below. The study pursues two aims. On the one hand, it endeavors to examine whether this practice is constrained by two social norms (fidelity and reproduction) that regulate behavior, given that spouses are expected to be faithful and provide children. On the other hand, the analysis deals with the potential problems of misreporting derived from the fact that the use of condoms is a sensitive topic and respondents are likely to hide their actual behavior. In addition, considerable effort has been made to identify some of the reasons for not telling the truth in the interview.

The analyses in Chapter 6 show that childless couples (or those with very few children) are less likely to have used condoms. This finding is coherent with the idea that condoms can only be introduced in marriage when spouses may negotiate their use as a method for spacing or stopping births. However, the proportion of husband's unfaithful network partners does not significantly influence the dependent variable in any of the two years in which the analysis has been replicated. Thus, no evidence has been found to support the hypothesis that a high frequency of extramarital sex in the social environment makes condom use a less conflicting practice with the norms that regulate marital relations. The result regarding the absence of influence of extramarital sex in the network does not support the research hypothesis. Nonetheless, the non-significant effect of this variable does not necessarily have to be interpreted as denoting a lack of association between condom use and the norm of fidelity. Quite the contrary, even if people perceive that the norm of fidelity is disobeyed by many others, the normative expectations might be so relevant that it is very unlikely that condom use for HIV-prevention purposes can have a place in marital sex. In other

words, in spite of the fact that extramarital sex is tolerated, unfaithful behavior is unlikely to be explicitly accepted, as the use of condoms for HIV prevention would imply. Moreover, the use of condoms within marriage involves taking for granted and accepting that condoms have not been used with other partners. Given that protected sex signals a lack of trust and love (Tavory and Swidler, 2009), then having not had used condoms signals a relationship in which individuals were emotionally involved. Therefore, the use of condoms within marriage implies accepting that at least one of the spouses has had an important relationship with someone else, which is likely to generate too much tension in the marital context. The results in Chapter 6 can also be considered evidence in favor of the argument set out in Chapter 5, in the sense that a stronger emphasis on the contraceptive function of condoms, instead of on their protective capacity, may be a good strategy for encouraging married couples to use them.

On the other hand, Chapter 6 also shows that those individuals that have been visited at home by experts who gave them information about ways of protecting against HIV/AIDS are more likely to overreport the use of condoms with their spouse. The interview process and the visit from experts might be interpreted by the respondents as similar situations, in the sense that some "experts" come to talk about HIV/AIDS and preventive behavior in both cases. Therefore, people are likely to associate both contexts and easily identify the behaviors that experts/interviewers expect them to have adopted to avoid getting infected and infecting others.

In a nutshell, the results of the dissertation show that, in rural contexts in Southeastern Africa, married people's behavior and attitudes towards extramarital sex and condom use within marriage are strongly shaped by their beliefs about how others behave and what others think is acceptable. The level of compliance with the norm of fidelity and the use and acceptability of modern contraception in the social network are found to be crucial factors. Thus, in order to identify the aspects that determine the spread of HIV/AIDS, we need to take into account

that the sexual life of rural Malawians and Kenyans cannot be understood without paying attention to their perceptions of their social environment.

7.2. Main contributions

As already mentioned, recent studies have observed that a great share of the new HIV infections in many sub-Saharan countries takes place in regular relationships. Moreover, a surprising finding is that at least two-thirds of the infected couples in several African countries are sero-discordant (de Walque, 2007b). These results should heighten our awareness about the need to focus efforts on understanding married people's sexual behavior and helping them to avoid getting HIV infected and infecting their regular partners. There is still very much to be done in this regard in both the research field and the prevention policies arena. Most research studies about preventive behavior take individuals as units of analysis and introduce the marital status as a control variable. However, this dissertation has endeavored to show some of the reasons why a more specific and careful examination of marital unions is worthwhile. In particular, this research highlights the need to take into consideration the role of the social norms that regulate this kind of relationship and the suitability of using an analytic approach that takes couples as units of analysis in the explanation of certain practices. Regarding the relevance of social norms, many qualitative studies have addressed this question. However, most quantitative research on HIV-preventive behavior recognizes their importance, but the analyses are not meant to measure such an influential effect. It should be noted, however, that theoretical models about the dynamics of social networks, which share many empirical implications with the theoretical approach used in this dissertation, are the basis of many analyses. This vacuum in the quantitative research is reasonable given the lack of consensus on the definition and measurement of social norms. This dissertation shows that Bicchieri's operational

definition of social norms may help to estimate their influence on individuals' behavior. Since her definition is based on preferences and expectations about others' behavior and opinions, a survey that includes suitable information about the ego's social networks enables us to explore this question. The application of a theoretical model on social norms to the quantitative study of HIV-preventive behavior is, then, innovative and pertinent.

Concerning the analytical approach, one of the most original contributions of the dissertation is the use of a statistical technique that enables us to take couples as units of analysis in the study of condom use. Two people are always involved in carrying out this HIV-preventive practice, even when one of them is forced or convinced by the other. Thus, taking into account the characteristics of both actors and the features of the relationship is the most appropriate strategy. Moreover, the quality of the information about such characteristics should improve if it is reported by each partner. Nonetheless, that is not enough, since it only improves the specification of the explanatory variables. Most studies construct the dependent variable by using the report of an individual. In fact, the most common strategy is to use the information reported by a respondent about herself, her partner, and the outcome that is intended to be examined. Chapter 6 takes advantage of having both the husband and the wife reports about the use of condoms within the marriage, and estimates a variable about the 'true' use of condoms by the couple. This strategy is not only more coherent with the theoretical approach, but it also deals with the problem of misreporting.

The reliability of the reports about sexual behavior is usually lower than that about less sensitive topics. This problem is not exclusive to surveys on sexuality, but is present in many other fields, such as voting, income, religion, and so on. The use of latent class analysis might help to deal with discrepancies on the reports in all those cases where more than one person gives information about the same thing. Moreover, the analysis in Chapter 6 simultaneously estimates the influence of the couple's characteristics on their likelihood of using condoms and the

biasing effect of an individual characteristic on the likelihood of misreporting. Unfortunately, the reliability of the men's reports about extramarital sex could not be evaluated with this technique, since their sexual partners are not interviewed or at least not with that purpose. However, the consistency between men's responses to several questions related to their extramarital sexual behavior has been examined.

The use of latent class analysis enables us to deal with one of the main methodological challenges of the dissertation. The other main challenge is to estimate the impact of social networks. Since the objective of the dissertation is to understand the mechanisms through which HIV-preventive behavior and attitudes are influenced by social interactions, the empirical analysis has been designed to estimate causal effects rather than the level of association between variables. This task is especially relevant in the case of social interactions because estimations from standard regressions are likely to be biased by the non-random distribution of social networks among individuals. Interlocutors are often selected by actors according to some criteria. One of the most common processes is that which results in homophily, which refers to the configuration of social networks among people sharing common characteristics. Individuals tend to interact with those who are similar to themselves in terms of interests, opinions, and so on. Therefore, respondents' behavior and their network partner's actions are likely to be correlated, but such association may simply reflect the active selection of similar interlocutors. The task of disentangling the effect of social interactions is thus not straightforward. The use of panel analysis with fixed effects in the empirical part of the dissertation aims to address this question. Being able to control for the observed and unobserved heterogeneity among individuals, the analysis estimated the effect of social interactions. The estimation process controlled for those personal traits that do not change over time in each individual and which make them more prone to interact with some people instead of others.

7.3. Major limitations

The study has also some shortcomings. First of all, the surveys used in the empirical analysis have not been explicitly designed for measuring social norms, so the indicators are simply proxies of the ideal measures. The MDICP and KDICP are very valuable databases because they include information about both social networks and individuals' behavior and attitudes. Thus, it is possible to relate HIV-preventive actions to the social environment. However, the study would have benefited from the availability of information about normative expectations. Questions on respondents' beliefs about their network partners' opinion on the acceptability of extramarital sexual relations would enable us to capture the whole picture of the social norm of fidelity. The analysis has assumed that, given the review of the literature and the respondents' reported opinion about the acceptability of extramarital sex, most people think that others consider that being faithful is how one ought to behave. But a more complete source of information would be very interesting for analyzing the relevance of the tensions between the two types of expectations.

Secondly, responses about sexual behavior and attitudes are likely to be misreported. Great effort has been made to deal with this potential problem in the analysis of condom use within marriage. However, addressing the reliability problem and the proper estimation of the causal effects of social norms at the same time is complex. The chapters that put the emphasis on facing one of the two challenges are less rigorous in tackling the other one. Chapters 4 and 5 make use of the longitudinal data in order to guarantee a better estimation of the impact of social networks, but the reliability analyses are merely descriptive. In turn, Chapter 6 uses a sophisticated model for dealing with the discrepancies in husband and wife reports, but the analysis is cross-sectional.

In addition to this, the dependent variable in Chapter 6 is not the ideal indicator of condom use. There is much debate about the most suitable measures, and the following ones are the most

convincing. On the one hand, asking about the use of condoms in the last sexual intercourse (with a particular partner) and the date of that event is very convenient, since the temporal order is known and the report is barely affected by subjective evaluations. The drawback of this measure is that it does not say anything about the consistency in the use of condoms, which is very relevant for HIV prevention and contraception. Thus, some studies differentiate condom users depending on the frequency of use. In Chapter 6, even if some information about the frequency of use is available, the small number of cases means that the analysis has a less specific dependent variable that distinguishes users from non-users.

Finally, it should be noted that the samples have not been designed to represent the national population, not even the whole rural population in Malawi and Kenya. Moreover, the lack of available data prevents us from replicating similar analyses in both countries, with the largest part of the research focusing on Malawi. Therefore, the scope of the conclusions from the analyses is restricted. Nonetheless, explaining HIV-preventive behavior and attitudes in the analyzed contexts may help to identify and understand the mechanisms through which those behaviors and attitudes are shaped in other parts of southeastern Africa. The theoretical arguments set out in the dissertation should be valid for other populations in the region where unfaithfulness is normatively disapproved of, condom use is associated with risky and 'illicit' sex, married people are expected to have children, and the use of modern contraception has notably increased in the last decades.

7.4. Policy implications

This research study should help to better understand the difficulties in the spread of preventive behaviors against HIV infection in the world region most affected by the epidemic. However, it also offers relevant knowledge that should be taken

into account in the design of prevention programs. Given the effectiveness of condom use in the protection against HIV and the crucial role of condom use in the control of the epidemic in populations such as homosexual communities in western countries, it is totally reasonable that many programs have focused on promoting this practice in sub-Saharan countries and many other regions. Thailand has offered a very clear example of a successful prevention policy addressed at generalizing the use of condoms in commercial sexual relations. The 100 Percent Condom Program in brothels was implemented through the distribution of condoms and the publicity in the media that encouraged condom use with prostitutes (Hanenberg *et al.*, 1994). However, nowadays most new HIV infections in southeastern Africa take place in regular relationships, where the introduction of condom use is likely to be more problematic. To suggest condom use to a regular partner for protection against HIV conflicts with the norms of fidelity and trust. Therefore, prevention programs must change the strategy for effectively promoting condom use in this kind of relationship. The analyses in the dissertation suggest that a stronger emphasis on the contraceptive function of condoms should facilitate the negotiation of its use in marital sex. A clear association between condoms and the risk of infection has probably deterred many people from suggesting their use with their spouse. However, the intention of using condoms for spacing or stopping births is more acceptable within the marital relation.

Uganda is usually mentioned as the sub-Saharan country that successfully controlled the incidence of HIV infections during the nineties. Some studies have tried to identify the direct causes of such success, and they highlight the key role of the reduction in the number of sexual partners (Stoneburner and Low-Beer, 2004; Green *et al.*, 2006). Also Morris and Kretzschmar (1995; 1997) have shown that sexual networks where concurrent long-term sexual relations are frequent facilitate a speedy spread of the HIV epidemic much more than networks where individuals have the same number of sexual partners but where relations are sequential.

According to the authors, this is one of the main reasons for the disproportionate HIV prevalence rates in sub-Saharan Africa. Thus, married individuals that have unprotected extramarital sex contribute to the spread of the disease. This is especially the case when they have lasting relationships in which condom use is also less likely to take place. The negative connotations of condoms also apply to stable relations outside marriage. Therefore, a shift in the strategy of the promotion of condom use might help individuals to avoid infection both outside and inside marriage. Couples are more likely to agree on using condoms if they interpret it as a contraceptive method rather than a preventive practice against HIV. In fact, the introduction of condom use for contraception in extramarital relationships should be easier since men and women are interested in avoiding illegitimate births.

As the empirical analyses have suggested, individual interpretation of a practice –condom use in this case– is shaped by the prevailing meaning and acceptability of that action in the social environment. Policy makers should not take for granted that we are actors that always take conscious decisions based on a cost-benefit evaluation. Many of our actions are guided by rules of behavior such as social norms. The results support the argument according to which individuals' expectations about how others behave are crucial for understanding their own behavior. As such, prevention campaigns should inform not only about the ways to protect against infection, but also about estimations on how many people in the community have adopted a preventive behavior already or have received the same information. In that sense, peer education programs and activities addressed at groups might be more efficient than visiting people in their homes, since they facilitate group communication and help to update expectations about what others know and think. Policy makers need to take into account that they are dealing with non-isolated individuals, whose preferences, opinions and behavior are notably affected by social conditions. Moreover, the adoption of certain sexual practices is the result of a decision taken by two actors that are involved in a particular relationship. Thus, couple-oriented prevention programs

may also be very important because they help individuals gain a better idea of their spouse's expectations, knowledge and opinions, and they also make couple communication on this issue easier.

REFERENCES

Achan, S.F.; P. Akweongo; C. Debpuur and J. Cleland (2009) "Coping Strategies of Young Mothers at Risk of HIV/AIDS in the Kassena-Nankana District of Northern Ghana", *African Journal of Reproductive Health* 13(1): 61-78.

Agadjanian, V. (2002) "Men's Talk about 'Women's Matters': Gender, Communication, and Contraception in Urban Mozambique", *Gender & Society* 16(2): 194-215.

Agadjanian, V. (2005) "Gender, religious involvement, and HIV/AIDS prevention in Mozambique", *Social Science & Medicine* 61: 1529-1539.

Ahlburg, D.A.; E.R. Jensen and A.E. Perez (1997) "Determinants of Extramarital Sex in the Philippines", *Health Transition Review* 7 (Suppl.): 467-479.

Ainsworth, M.; K. Beegle and A. Nyamete (1996) "The Impact of Women's Schooling on Fertility and Contraceptive Use: A Study of Fourteen Sub-Saharan Countries", *The World Bank Economic Review* 10(1): 85-122.

Akwara, P.A.; N.J. Madise and A. Hinde (2003) "Perception of Risk of HIV/AIDS and Sexual Behavior in Kenya", *Journal of Biosocial Science* 35: 385-411.

Alexander, J. (2003) *The Meanings of Social Life: A Cultural Sociology*. New York: Oxford University Press.

Ali, M.M.; J.G. Cleland and M. Carael (2001) "Sexual Risk Behavior in Urban Populations of Northeastern Africa", *AIDS and Behavior* 5: 343-352.

Ali, M.M.; J. Cleland and I.H. Shah (2004) "Condom Use within Marriage: a Neglected HIV Intervention", *Bulletin of the World Health Organization* 82: 180-186.

Aloo-Obunga, C. (2003) *Country Analysis of Family Planning and HIV/AIDS: Kenya*. Washington D.C.: The POLICY Project.

Amuyunzu-Nyamongo, M.; L. Tendo-Wambua; B. Babishangire; J. Nyagero; N. Yitbarek; M. Matasha and T. Omurwa (1999) "Barries to Behavior Change as a Response to STD including HIV/AIDS: The East African Experience" in Caldwel J.C. *et al.* (eds.) *Resistance to Behavioural Change to Reduce HIV/AIDS Infection*. Canberra, Australia: Health Transition Centre, The Australian National University.

Anderson, E. (2000) *Code of the Street: Decency, Violence, and the Moral Life of the Inner City*. New York: W.W. Norton and Company.

Anglewicz, P.; J. Adams; F. Obare; H-P. Kohler and S. Watkins (2009) "The Malawi Diffusion and Ideational Change Project 2004-06: Data Collection, Data Quality and Analysis of Attrition", *Demographic Research* 20: 503-540.

Anglewicz, P.A.; S. Bignami-Van Assche; S. Clark and J. Mkandawire (2010) "HIV Risk among Currently Married Couples in Rural Malawi: What do Spouses Know about Each Other?", *AIDS and Behavior* 14(1): 103-112.

Askew, I. and N. Baker Maggwa (2002) "Integration of STI Prevention and Management with Family Planning and Antenatal Care in Sub-Saharan Africa –What More Do We Need to Know?", *International Family Planning Perspectives* 28(2):77-86.

Auvert, B.; D. Taljaard; E. Lagarde; J. Sobngwi-Tambekou; R. Sitta and A. Puren (2005) "Randomized, Control Intervention Trial of Male Circumcision for Reduction of HIV Infection Risk: The ANRS 1265 Trial", *PLoS Med* 2(11).

Awusabo-Asare, K. and J.K. Anarfi (1997) "Health-Seeking Behavior of Persons with HIV/AIDS in Ghana", *Health Transition Review* 7 Suppl: 243-256.

Awusabo-Asare,K.; J.K. Anarfi and D.K. Agyeman (1993) "Women's Control over Their Sexuality and the Spread of STDs and HIV/AIDS in Ghana", *Health Transition Review* 3, Suppl.

Bailey, R.C.; S. Moses; C.B. Parker; K. Agot; I. Maclean; J.N. Krieger; C.F.M. Williams; R.T. Campbell and J.O. Ndinya-Achola (2007) "Male Circumcision for HIV Prevention in Young Men in Kisumu, Kenya: A Randomized Controlled Trial", *Lancet* 369(9562): 643-656.

Balogun, A.S. (2010) "Islamic Perspectives in HIV/AIDS and Antiretroviral Treatment: The Case of Nigeria", *African Journal of AIDS Research* 9(4): 459-466.

Bankole, A.; F.H. Ahmed; S. Neema; C. Ouedraogo and S. Konyani. (2007) "Knowledge of Correct Condom Use and Consistency of Use among Adolescents in Four Countries in Sub-Saharan Africa", *African Journal of Reproductive Health* 11(3): 197-220.

Barber, N. (2008) "Explaining Cross-National Differences in Polygyny Intensity: Resource Defense, Sex Ratio, and Infectious Diseases", *Cross-Cultural Research* 42(2): 103-117.

Barden-O'Fallon, J.L.; J. de Graft-Johnson; T. Bisika; S. Sulzbach; A. Benson; and A.O. Tsui (2004) "Factors Associated with HIV/AIDS Knowledge and Risk Perception in Rural Malawi", *AIDS and Behavior* 8(2): 131-140.

Bauni, E.K. and B.O. Jarabi (2000) "Family Planning and Sexual Behavior in the Era of HIV/AIDS: The Case of Nakuru District, Kenya", *Studies in Family Planning* 31(1): 69-80.

Becker, S. (1999) "Measuring Unmet Needs: Wives, Husbands, or Couples?" *International Family Planning Perspectives* 24(1): 15-36.

Behrman, J.R.; H-P. Kohler and S. Watkins (2001) "How Can We Measure the Causal Effects of Social Networks Using Observational Data? Evidence from the Diffusion of Family Planning and AIDS Worries in South Nyanza District, Kenya", *MPIDR Working Paper* 22.

Behrman, J.R.; H-P. Kohler and S. Watkins (2002) "Social Networks and Changes in Contraceptive Use Over Time: Evidence from a Longitudinal Study in Rural Kenya", *Demography* 39(4): 713-738.

Bicchieri, C. (2006) *The Grammar of Society. The Nature and Dynamics of Social Norms*. New York: Cambridge University Press.

Bicchieri, C. (2008) "The Fragility of Fairness: An Experimental Investigation on the Conditional Status of Pro-Social Norms", *Philosophical Issues* 18(1): 229-248.

Bicchieri, C. (2010) "Norms, Preferences, and Conditional Behavior" *Politics, Philosophy and Economics* 9(3): 297-313.

Bicchieri, C. and A. Chavez (2010) "Behaving as Expected: Public Information and Fairness Norms", *Journal of Behavioral Decision Making* 23(2): 161-178.

Bicchieri, C. and E. Xiao (2008) "Do the Right Thing: But Only if Others Do", *Journal of Behavioral Decision Making* 22: 191-208.

Bignami-Van Assche, S. (2003) "Are We Measuring What We Want to Measure? An Analysis of Individual Consistency in Survey Response in Rural Malawi", *Demographic Research,* Special Collection 1(3), 77-108.

Bignami-Van Assche, S.; G. Reniers and A.A. Weinreib (2003) "An Assessment of the KDICP and the MDICP Data Quality: Interviewer Effects, Question Reliability and Sample Attrition", *Demographic Research*, Special Collection 1: 31-76.

Bingenheimer, J.B. (2010) "Men's Multiple Sexual Partnerships in 15 Sub-Saharan African Countries: Sociodemographic Patterns and Implications", *Studies in Family Planning* 41(1): 1-17.

Blau, P.M. (1994) *Structural Contexts of Opportunities*. Chicago: The University of Chicago Press.

Blecher, M.; M. Steinberg; W. Pick M. Hennink & N. Durcan (1995) "AIDS Knowledge, Attitudes and Practices among

STD Clinic Attenders in the Cape Peninsula", *South African Medical Journal* 85(12): 1281-1286.

Bolton, G.E. and A. Ockenfels (2000) "ERC: A Theory of Equity, Reciprocity, and Competion", *American Economic Review* 90(1): 166-193.

Bongaarts, J. (2007) "Late Marriage and the HIV Epidemic in Sub-Saharan Africa, *Population Studies* 61(1): 73-83.

Bongaarts, J.; W.P. Mauldin; and J.F. Phillips (1990) "The Demographic Impact of Family Planning Programs", *Studies in Family Planning* 21(6): 299-310.

Bongaarts, J. and S.C. Watkins (1996) "Social Interactions and Contemporary Fertility Transitions", *Population and Development Review* 22(4): 639-682.

Boone, C. and J. Batsell (2001) "Politics and AIDS in Africa: Research Agendas in Political Science and International Relations", *Africa Today*: 3-33.

Bowles, S. and H. Gintis (1998) "The Moral Economy of Communities: Structured Population and the Evolution of Pro-Social Norms", *Evolution and Human Behavior* 19(1): 3-25.

Breen, R. (2000) "Why Is Support for Extreme Parties Underestimated by Surveys? A Latent Class Analysis", *British Journal of Political Science* 30(2): 375-382.

Bühler, C. and H-P. Kohler (2003) "Talking about AIDS: The Influence of Communication Networks on Individual Risk Perceptions of HIV/AIDS Infections and Favored Protective Behaviors in South Nyanza District, Kenya", *Demographic Research*, Special Collection 1(13): 397-438.

Caldwell, J.C. (1963) "Fertility Decline and Female Chances of Marriage in Malaya", *Population Studies* 17(1): 20-32.

Caldwell, J.C. (1976) "Toward a Restatement of Demographic Transition Theory", *Population and Development*, 2: 321-366.

Caldwell, J.C. (1982) *Theory of fertility decline*. London: Academic Press.

Caldwell, J.C. (1999) "Reasons for Limited Sexual Behavioural Change in the Sub-Saharan African AIDS Epidemic, and Possible Future Intervention Strategies" in J.C. Caldwel *et al.*

(eds.) *Resistance to Behavioural Change to Reduce HIV/AIDS Infection*. Canberra, Australia: Health Transition Centre, The Australian National University.

Caldwell, J.C. (2000) "Rethinking the African AIDS Epidemic", *Population and Development Review* 26(1): 117-135.

Caldwell, J.C. and P. Caldwell (1993) "The Nature and Limits of the sub-Saharan African AIDS Epidemic: Evidence from Geographic and Other Patterns", *Population and Development Review* 19: 817-848.

Caldwell, J.C. and P. Caldwell (1996) "The African AIDS Epidemic", *Scientific American* 274: 62-68.

Caldwell, J.C.; I.O. Orubuloye and P. Caldwell (1992) "Underreaction to AIDS in Sub-Saharan Africa", *Social Science and Medicine* 34(11): 1169-1182.

Cameron D.W.; L.J. D'Costa; G.M. Maitha; M. Cheange; P. Piotd; J.N. Simonsena; A.R. Ronalde; M.N. Gakinyaa; J.O. Ndinya-Acholaa; R.C. Brunhame and F.A. Plummera (1989) "Female to Male Transmission of Human Immunodeficiency Virus Type 1: Risk Factors for Seroconversion in Men", *Lancet* 334(8660): 403-407.

Campbell, C. and C. MacPhail (2002) "Peer Education, Gender and the Development of Critical Consciousness: Participatory HIV Prevention by South African Youth", *Social Science and Medicine* 55: 331-45.

Carael, M. (1995) "Sexual Behavior" in J.G. Cleland and B. Ferry (eds.) *Sexual Behavior and AIDS in the Developing World*. London: Taylor and Francis.

Carael, M.; M. Ali and J. Cleland (2001) "Nuptiality and Risk Behavior in Lusaka and Kampala", *African Journal of Reproductive Health* 5: 83-89.

Carpenter, L.M.; A. Kamali; A. Ruberantwari; S.S. Malamba and J.A.G. Whitworth (1999) "Rates of HIV-1 Transmission within Marriage in Rural Uganda in Relation to the HIV Sero-status of the Partners", *AIDS* 13(9): 1083-1089.

Chaiken S. and Y. Trope (1999) *Dual-Process Theories in Social Psychology*. New York: The Guildford Press.

Chimbiri, A. (2006) "Development, Family Change, and Community Empowerment in Malawi" in Y. Oheneba-Sakyi and B.K. Takyi (eds.) *African Families at the Turn of the 21st Century*, Westport, CT: Praeger Publishers.

Chimbiri, A.M. (2007) "The Condom is an 'Intruder' in Marriage: Evidence from Rural Malawi", *Social Science & Medicine* 64: 1102-1115.

Chwe, M.S.Y. (1999) "Structure and Strategy in Collective Action", *American Journal of Sociology* 105(1); 128-56.

Cialdini, R.B.; C.A. Kallgren; and R.R. Reno (1991) "A Focus Theory of Normative Conduct: A Theoretical Refinement and Reevaluation of the Role of Social Norms is Human Behavior", *Advances in Experimental Social Psychology* 24: 201-234.

Clark, S. (2004) "Early Marriage and HIV Risks in Sub-Saharan Africa", *Studies in Family Planning* 35(3): 149-160.

Clark, S. (2010) "Extra-Marital Sexual Partnerships and Male Friendships in Rural Malawi", *Demographic Research* 22(1): 1-28.

Clark, S.; C. Kabiru and R. Mathur (2010) "Relationship Transitions among Youth in Urban Kenya", *Journal of Marriage and Family* 72(1): 73-88.

Clay, D. and J.A. Vander Haar (1993) "Patterns of Intergenerational Support and Childbearing in the Third World", *Population Studies* 47(1): 67-83.

Cleland, J. and M.M. Ali. (2006) "Sexual Abstinence, Contraception, and Condom Use by Young African Women: A Secondary Analysis of Survey Data", *Lancet* 368: 1788-1793.

Crowne, D.P. and D.A. Marlowe (1960) "A New Scale of Social Desirability Independent of Psychopathology", *Journal of Consulting Psychology* 24: 349-354.

Davis, K.R. and S.C. Weller (1999) "The Effectiveness of Condoms in Reducing Heterosexual Transmission of HIV", *Family Planning Perspectives* 31(6): 271-279.

de Visser, R.O.; D.E. Rissel; J. Richters and A.E. Grulich (2003) "Heterosexual Experience and Recent Heterosexual Encounters among a Representative Sample of Adults", *Australian and New Zealand Journal of Public Health* 27(2): 146-154.

de Walque, D. (2007a) "How does the Impact of an HIV/AIDS Information Campaign Vary with Educational Attainment? Evidence from Rural Uganda", *Journal of Development Economics* 84(2): 686-714.

de Walque, D. (2007b) "Sero-Discordant Couples in Five African Countries: Implications for Prevention Strategies", *Population and Development Review* 33(3): 501-523.

de Walque, D. and R. Kline (2011) "Variations in Condom Use by Type of Partner in 13 Sub-Saharan African Countries", *Studies in Family Planning* 42(1): 1-10.

DeMaio, T.J. (1984) "Social Desirability and Survey Measurement: A Review" in C.F. Turner and E. Martin (eds.) *Surveying Subjective Phenomena.* New York: Russell Sage Foundation.

Detels, R.; B.R. Visscher; L.P. Jacobson; L.A. Kingsley; J.S. Chmiel and L.J. Eldred (1990) "Sexual Activity, Condom Use, and HIV-1 Seroconversion" in B.R. Voeller; J.M. Reinisch and M. Gottlieb (eds.) *AIDS and Sex: An Integrated Biomedical and Biobehavioral Approach.* New York: Oxford University Press.

Dilger, H. (2003) "Sexuality, AIDS, and the Lures of Modernity: Reflexivity and Morality among Young People in Rural Tanzania", *Medical Anthropology* 22: 23-52.

Dolcini, M.; L. Canin; A. Gandelman and H. Skolnik (2004) "Theoretical Domains: a Heuristic for Teaching Behavioral Theory in HIV/STD Prevention Courses", *Health Promotion Practice* 5:404-417.

Dunkle, K.; R. Stephenson; E. Karita; E. Chomba; K. Kayitenkore; C. Vwalika; L. Greenberg and S. Allen (2008) "New Heterosexually Transmitted HIV in Married or Cohabiting Couples in Urban Zambia and Rwanda: An

Analysis of Survey and Clinical Data", *Lancet* 371: 2183-2191.

Elias, N. (1982) The History of Manners. New York: Pantheon Books.

Elster, J. (1989) *The Cement of Society. A Study of Social Order.* Cambridge: Cambridge University Press.

Elster, J. (2007) *Explaining Social Behavior: More Nuts and Bolts for the Social Sciences.* New York: Cambridge University Press.

Entwisle, B.; R.R. Rindfuss; D.K. Guilkey; A. Chamratrithirong; S.R. Curran and Y. Sawangdee (1996) "Community and Contraceptive Choice in Rural Thailand: A Case Study if Nang Rong", *Demography* 33(1): 1-11.

Ezeh, A.C. (2000) "Differences in Reporting of Contraceptive Use among Marital Partners", *African Population and Health Research Center,* Working Paper, 15. Nairobi: Population Council.

Ezeh, A.C.; M. Seroussi and H. Raggers (1996) *Men's Fertility, Contraceptive Use, and Reproductive Preferences,* DHS Comparative Studies 18. Calverton, MD.: Macro International.

Family Health International (2004) "Integrating Services", Network 23(3).

Fassin, D. and H. Schneider (2003) "The Politics of AIDS in South Africa: Beyond the Controversies", *British Medical Journal* 326: 495-497.

Fazio, R.H. (1990) "Multiple Processes by Which Attitudes Guide Behavior: The Mode Model as an Integrative Framework" in M.P. Zanna (ed.) *Advances in Experimental Social Psychology,* vol.23. New York: Academic Press.

Fehr, E. and U. Fischbacher (2004) "Third-Party Punishment and Social Norms", *Evolution and Human Behavior* 25(2): 63-87.

Fehr, E. and S. Gächter (2000) "Cooperation and Punishment in Public Goods Experiments", *American Economic Review* 90(4): 980-994.

Fehr, E. and K.M. Schmidt (1999) "A Theory of Fairness, Competition, and Cooperation", *The Quarterly Journal of Economics* 114(3): 817-868.

Ferguson, A.; M. Pere; C, Morris; E. Ngugi and S. Moses (2004) "Sexual Patterning and Condom Use among a Group of HIV Vulnerable Men in Thika, Kenya", *Sexually Transmitted Infections* 80: 435-439.

Feyisetan, B. (2000) "Spousal Communication and Contraceptive Use among the Yoruba of Nigeria", *Population Research and Policy Review* 19: 29-45.

Fischbacher, U.; S. Gächter and E. Fehr (2001) "Are People Conditionally Cooperative? Evidence from a Public Goods Experiment", *Economics Letter* 71(3): 397-404.

Fowler, F.J. (1993) *Survey Research Methods*. Newbury Park, CA: Sage Publications.

Fredland, R.A. (1998) "AIDS and Development: An Inverse Correlation?", *Journal of Modern African Studies* 36(4): 547-568.

Gage, A.J. and D. Ali (2003) "Spousal Communication and HIV-Preventive Behaviors among Men in Uganda" Paper presented at the *Annual meeting of the Population Association of America*, Minneapolis, Minnesota.

Garner, R.C. (2000) "Safe sects? Dynamic religion and AIDS in South Africa", *The Journal of Modern African Studies* 38: 41-69.

Gausset, Q. (2001) "AIDS and Cultural Practices in Africa: the Case of the Tonga (Zambia)", *Social Science and Medicine* 52: 509-18.

Geertz, C. (1973) *The Interpretation of Cultures*. New York: Basic Books.

Gelmon, L.; P. Kenya; F. Oguya; B. Cheluget and G. Haile (2009) *Kenya HIV Prevention Response and Modes of Transmission Analysis*. Nairobi, Kenya: National AIDS Control Council.

Gillespie, S.; S. Kadiyala and R. Greener (2007) "Is Poverty or Wealth Driving HIV Transmission?", *AIDS* 21: 5-16.

Gintis, H.; S. Bowles; R. Boyd and E. Fehr (2003) "Explaining Altruistic Behavior in Humans", *Evolution and Human Behavior* 24: 153-172.

Gintis, H.; S. Bowles; R. Boyd and E. Fehr (2005) *Moral Sentiments and Material Interests: The Foundations of Cooperation in Economic Life.* Cambridge, MA: MIT Press.

Glynn, J.R.; A. Buvé; M. Caraël, I.B. Macauley; M. Kahindo, R.M. Musonda and L. Zekeng (2001a) "Is Long Postpartum Sexual Abstinence a Risk Factor for HIV?", *AIDS* 15(8): 1059.1061.

Glynn, J.R.; M. Carael; B. Auvert; M. Kahindo; M. Chege and R.M. Musonda (2001b) "Why do Young Women Have a Much Higher Prevalence of HIV than Young Men? A Study in Kisumu, Kenya and Ndola, Zambia", *AIDS* 15 (Suppl.4): S51-S60.

Goffman, E. (1963) *Stigma. Notes on the Management of Spoiled Identity.* New York: Simon & Schuster.

Granovetter, M.S. (1973) "The Strength of Weak Ties", *American Journal of Sociology* 78(6): 1360-1380.

Granovetter, M.S. (1978) "Threshold Models of Collective Behavior", *American Journal of Sociology* 83(6): 1420-1443.

Gray, R.H.; G. Kigozi; D. Serwadda; F. Makumbi; S. Watya; F. Nalugoda; N. Kiwanuka; L.H. Moulton; M.A. Chaudhary; M.Z. Chen; N.K. Sewankambo; F. Wabwire-Mangen; M.C. Bacon *et al.* (2007) "Male Circumcision for HIV Prevention in Men in Rakai, Uganda: A Randomized Trial", *Lancet* 369 (9562): 657-666.

Gray, R.H.; M.J. Wawer; R. Brookmeyer; N.K. Sewankambo; D. Serwadda; F. Wabwire-Mangen; T. Lutalo; X. li; T. vanCott; T.C. Quinn and the Rakai Project Team (2001) "Probability of the HIV-1 Transmission per Coital Act in Monogamous, Heterosexual, HIV-1-Discordant Couples in Rakai, Uganda", *Lancet* 357: 1149-1153.

Green, E.C.; D.T. Halperin; V. Nantulya and J.A. Hogle (2006) "Uganda's HIV Prevention Success: The Role of Sexual

Behavior Change and the National Response", *AIDS and Behavior* 10(4): 335-346.

Gregson, S.; T. Zhuwau; J. Ndlovu and C. Nyamukapa (2002) "Methods to Reduce Social Desirability Bias in Sex Surveys in Low-Development Settings", *Sexually transmitted Diseases*, 29 (10): 568-575.

Hagenaars, J.A. (1993). *Loglinear Models with Latent Variables*. Series: Quantitative Applications in the Social Sciences. Newbury Park, CA: Sage Publications.

Hagenaars, J.A. and A. McCutcheon (2002) *Applied Latent Class Analysis*. Newbury Park, CA.: Sage Publications.

Halperin, D.T. and H. Epstein (2004) "Concurrent Sexual Partners Help to Explain Africa's High HIV Prevalence: Implications for Prevention", *Lancet* 363: 4-6.

Halperin, D.T. and H. Epstein (2007) "Why Is HIV Prevalence so Severe in Southern Africa", *The Southern African Journal of HIV Medicine* 26: 19-24.

Hanenberg, R.S.; D.C. Sokal; W. Rojanapithayakorn and P. Kunasol (1994) "Impact of Thailand's HIV-Control Programme as Indicated by the Decline of Sexually Transmitted Diseases", *Lancet* 344(8917): 243-245.

Hargreaves, J.R.; C.P. Bonell; T. Boler; D. Boccia; I. Birdthistle; A. Fletcher; P.M. Pronyk and J.R. Glynn (2008) "Systematic Review Exploring Time Trends in the Association between Educational Attainment and Risk of HIV Infection in Sub-Saharan Africa", *AIDS* 22: 403-414.

Harvey, S. M.; S.T. Bird; J.T. Henderson; L.J. Beckman and H.C. Huszti (2004) "He Said, She Said. Concordance between Sexual Partners", *Sexually Transmitted Diseases*, 31 (3).

Hechter, M. (2008) "The Rise and Fall of Normative Control", *Accounting, Organizations and Society* 33(6): 663-676.

Hechter, M. and K-D. Opp (2001) *Social Norms*. New York: Russell Sage Foundation.

Helleringer, S. and H-P. Kohler (2005): "Social Networks, Perceptions of Risk, and Changing Attitudes towards

HIV/AIDS: New Evidence from a Longitudinal Study Using Fixed-Effects Analysis", *Population Studies* 59(3).

Hendriksen, E.S.; A. Pettifor; S.J. Lee; T.J. Coates and H.V. Rees (2007) "Predictors of Condom Use among Young Adults in South Africa: The Reproductive Health and HIV Research Unit National Youth Survey", *American Journal of Public Health* 97(7): 1241-1248.

Hirsch, J.S.; J. Higgins; M.E. Bentley and C.A. Nathanson (2002) "The Social Construction of Sexuality: Marital Infidelity and Sexually Transmitted Disease–HIV Risk in a Mexican Migrant Community", *American Journal of Public Health* 92(8): 1227-1237.

Holmes, K.K.; R. Levine and M. Weaver (2004) "Effectiveness of Condoms in Preventing Sexually Transmitted Infections", *Bulletin of the World Health Organization* 82(6): 454-461.

Hughes-D'Aeth, A. (2002) "Evaluation of HIV/AIDS Peer Education Projects in Zambia", *Evaluation and Program Planning* 25 (4): 397-407.

Hugonnet, S; F. Mosha; J. Todd; K. Mugeye; A. Klokke; L. Ndeki; D. Ross; H. Grosskurth and R. Hayes (2002) "Incidence of HIV Infection in Stable Sexual Partnerships: A Retrospective Cohort Study of 1802 Couples in Mwanza Region, Tanzania", *Journal of Acquired Immune Deficiency Syndromes* 30(1): 73-80.

Hunter, M. (2002) "The Materiality of Everyday Sex: Thinking beyond 'Prostitution'", *African Studies* 61(1): 99-120.

Hunter, M. (2005) "Cultural Politics and Masculinities: Multiple Partners in Historical Perspectives in KwaZulu-Natal", *Culture, Health, and Sexuality* 7(4): 389-403.

Huygens, P.; E. Kajura; J. Seeley and T. Barton (1996) "Rethinking Methods for the Study of Sexual Behaviour", *Social Science & Medicine* 42(2): 221-231.

Isiugo-Abanihé, U.C. (1994) "Extramarital Relations and Perceptions of HIV/AIDS in Nigeria", *Health Transition Review* 4(2): 111-125.

Isiugo-Abanihé, U.C. (1998) "Stability of Marital Unions and Fertility in Nigeria", *Journal of Biosocial Science* 30: 33-41.

Johnson, K. (2004) "The Politics of AIDS Policy Development and Implementation in Postapartheid South Africa", *Africa Today* 51(2): 107-128.

Kahneman D. and A. Tversky (1973) "Availability: A Heuristic for Judging Frequency and Probability", *Cognitive Psychology* 4: 207-232.

Kaler, A. (2001) "'Many Divorces and Many Spinsters': Marriage as an Invented Tradition in Southern Malawi, 1946-1999", *Journal of Family History* 26(4): 529-556.

Kaler, A. (2003) "'My Girlfriends Could Fill a Yanu-yanu Bus': Rural Malawian's Claim about their Own Serostatus", *Demographic Research* Special Collection 1(11): 349-372.

Kaler, A. (2004) "AIDS-Talk in Everyday Life: The Presence of HIV/AIDS in Men's Informal Conversation in Southern Malawi", *Social Science and Medicine* 59: 285297.

Katz, E. and P.F. Lazarsfeld (1955) *Personal Influence: The Part Play by People in the Flow of Mass Communications*. New York: Free Press.

Kay, A.C.; C.S. Wheeler; J.A. Bargh and L. Ross (2004) "Material Priming: The Influence of Mundane Physical Objects on Situational Construal and Competitive Behavioral Choice", *Organizational Behavior and Human Decision Processes* 95: 83-96.

Kelly, R.J.; R. Gray; N. Sewankambo; D. Serwadda; F. Wabwire-Mangen; T. Lutalo and M.J. Wawer (2003) "Age Differences in Sexual Partners and Risk of HIV-1 Infection in Rural Uganda", *Journal of Acquired Immune Deficiency Syndromes* 32: 446-451.

Kenya National Bureau of Statistics and ICF Macro (2010) *Kenya Demographic and Health Survey 2008-09*. Calverton, Maryland: KNBS and ICF Macro.

Khobotlo, M.; R. Tshehlo; J. Nkonyana; M. Ramoseme; M. Khobotle; A. Chitoshia; M. Hildebrand and N. Fraser (2009) *Lesotho: HIV Prevention Response and Modes of*

Transmission Analysis. Maseru, Lesotho: National AIDS Comission.

Kiddugavu, M.; F. Makumbi; M. Wawer; D. Serwadda; N. Sewankambo; F. Wabwire-Mangen; T. Lutalo; M. Meehan; E. Xianbin; R. Gray and Rakai Project Study Group (2003) "Hormonal Contraceptive Use and HIV-1 Infection in a Population-Based Cohort in Rakai, Uganda", *AIDS* 17(2): 233-240.

Kimuna, S.R. and Y.K. Djamba (2005) "Wealth and Extramarital Sex among Men in Zambia", *International Family Planning Perspectives* 31(2): 83-89.

Kissinger, P.; J. Rice; T. Farly; S. Trim; K. Jewitt; V. Margavio and D.H. Martin (1999) "Application of Computer-Assisted Interviews to Sexual Behavior Research", *American Journal of Epidemiology* 149 (10): 950-954.

Koenig, M.; G.B. Simmons and B.D. Misra (1984) "Husband-Wife Inconsistencies in Contraceptive Use Reports", *Population Studies* 38(2): 291-298.

Kohler, H-P. (2001) *Fertility and social interactions: an economic perspective*. Oxford: Oxford University Press.

Kohler, H-P.; J. Behrman and S. Watkins (2001) "The Density of Social Networks and Fertility Decisions: Evidence from South Nyanza District, Kenya", *Demography* 38(1): 43-58.

Kohler, H-P.; J. Behrman and S. Watkins (2007) "Social Networks and HIV/AIDS Risk Perceptions", *Demography* 44 (1): 1-33.

Kravdal, Ø. (2002) "Education and Fertility in sub-Saharan Africa: Individual and Community Effects", *Demography* 39(2): 233-250.

Kuran, T. (1997) *Private Truths, Public Lies*. Cambridge, MA.: Harvard University Press.

Lagarde, E; M. Caraël; J.R. Glynn; L. Kanhonou; S.C. Abega; M. Kahindo; R. Musonda; B.H. Auvert; A. Buvé (2001) "Educational Level Is Associated with Condom Use within Non-Spousal Partnerships in Four Cities of Sub-Saharan Africa", *AIDS* 15(11): 1399-1408.

Lamberts, K. and D. Shanks (1997) *Knowledge, concepts, and categories*, Hove: Psychology Press.

Lanegran K. and G. Hyden (1993) "Mapping the Politics of AIDS: Illustrations from East Africa", *Population and Environment: A Journal of Interdisciplinary Studies* 14(3): 245-263.

Leonard, L.; I. Ndiaye; A. Kapadia; G. Eisen; O. Diop; S. Mboup; and P. Kanki (2000) "HIV Prevention among Male Clients of Female Sex Workersin Kaolach, Senegal: Results of a Peer Education Program", *AIDS Education and Prevention* 12(1): 21-37.

Liberman, V.; S.M. Samuels and L. Ross (2004) "The Name of the Game: Predictive Power of Reputations versus Situational Labels in Determining Prisoner's Dilemma Game Moves", P*ersonality and Social Psychology Bulletin* 30: 1175-85.

Lindan, C.; S. Allen; M. Carael; F. Nsengumuremyi; P. Van de Perre; A. Serufilira; J. Tice; D. Black; T. Coates and S. Hulley (1991) "Knowledge, attitudes, and perceived risk of AIDS among urban Rwandan women: relationship to HIV infection and behavior change", *AIDS* 5: 993-1002.

Luke, N. (2006) "Exchange and Condom Use in Informal Sexual Relationships in Urban Kenya", *Economic Development and Cultural Change* 54(2): 319-348.

Luke, N. (2007) "Economic Status, Informal Exchange, and Sexual Risk in Kisumu, Kenya", *Economic Development and Cultural Change* 56(2): 375-396.

Lurie, M.N.; B.G. Williams; K. Zuma; D. Mkaya-Mwaburi; G.P. Garnett; M.D. Sweat; J. Gittelsohn and S.S.A. Karim (2003) "Who Infects Who? HIV-1 Concordance and Discordance among Migrant and non-Migrant Couples in South-Africa", *AIDS* 17(15): 2245-2252.

Macaluso, M.; M. Demand; L. Artz and E.W. Hook (2000) "Partner Type and Condom Use", *AIDS* 14(5): 537-546.

Mackie, G. (1996) "Ending Footbinding and Infibulation: A Convention Account", *American Sociological Review* 61(6): 999-1017.

Maharaj, P. (2001) "Obstacles to negotiating dual protection: Perspectives of men and women", *African Journal of Reproductive Health* 5: 150-161.

Maharaj, P. and J. Cleland (2004) "Condom Use within Marital and Cohabiting Partnerships in Kwazulu-Natal, South Africa", *Studies in Family Planning* 35(2): 116-124.

McCoombe, S.G. and R.V. Short (2006) "Potential HIV-1 Target Cells in the Human Penis", *AIDS* 20(11): 1491-1495.

McCutcheon, A. (1987) *Latent Class Analysis.* Newbury Park, CA: Sage Publications.

Meekers, D. (1992) "The Process of Marriage in African Societies: A Multiple Indicator Approach", *Population and Development Review* 18(1): 61-78.

Mekonnen, Y.; S. Bradley; M. Malkin and K. Hardee (2004) *Country Analysis of Family Planning and HIV/AIDS: Ethiopia.* Washington D.C.: The POLICY Project.

Miller, K.; E.M. Zulu and S.C. Watkins (2001) "Husband-Wife Survey Responses in Malawi", *Studies in Family Planning* 32(2): 161-174.

Mishra, V. and S. Bignami-Van Assche (2009) "Concurrent Sexual Partnerships and HIV Infection: Evidence from National Population-Based Surveys", *DHS Working Paper* 62.

Mishra, V.;S. Bignami-Van Assche; R. Greener; M. Vaessen; R. Hong; P.D. Ghys; J.T. Boerma; A. Van Assche; S. Khan and S. Rutstein (2007) "HIV Infection Does Not Disproportionately Affect the Poorer in sub-Saharan Africa", *AIDS* 21: S17-S28.

Mitchell, J.C. (1951) "The Yao of Southern Nyasaland" in E. Colson and M. Gluckman (eds.) *Seven Tribes of Central Africa*. Manchester, UK: Manchester University Press.

Mitsunaga, T.M.; A.M. Powell; N.J. Heard and U.M. Larsen (2005) "Extramarital Sex among Nigerian Men: Polygyny and Other Risk Factors", *Journal of Acquired Immune Deficiency Syndromes* 39: 478:488.

Mngadi S.; N. Fraser; H. Mkhatshwa; T. Lapidos; T. Khumalo; S. Tsela; N. Nhlabatsi and H. Odido (2009) *Swaziland: HIV*

Prevention Response and Modes of Transmission Analysis. Mbabane, Swaziland: National Emergency Response Council on HIV/AIDS.

Montgomery, M.R. and J.B. Casterline (1996) "Social Learning, Social Influence, and New Models of Fertility", *Population and Development Review* 22: 151-175.

Morris, M. and M. Kretzschmar (1995) "Concurrent Partnerships and Transmission Dynamics in Networks", *Social Networks* 17(3-4): 299-318.

Morris, M. and M. Kretzschmar (1997) "Concurrent Partnerships and the Spread of HIV", *AIDS* 11: 641-648.

Morris, M.; M.J. Wawer; F. Makumbi; J.R. Zavisca and N. Sewankambo (2000) "Condom Acceptance is Higher among Travellers in Uganda", *AIDS* 14: 733-741.

Morroni, C.; J. Smit; L. McFadyen; M. Mqhayi and M. Beksinska (2003) "Dual protection against sexually transmitted infections and pregnancy in South Africa", *African Journal of Reproductive Health* 7: 13-19.

Muhwava, W. (2004) "Condom Use within Marriage and Consensual Unions in the Era of HIV/AIDS in Zimbabwe", *African Population Studies* 19(1): 119-141.

Munthali, A.C.; A. Chimbiri; and E. Zulu (2004) *Adolescent Sexual and Reproductive Health: A Synthesis of Research Evidence. Occasional Report*, New York: The Allan Guttmacher Institute, 15.

Nachega, J.B.; D.A. Lehman; D. Hlatshwayo; R. Mothopeng; R.E. Chaisson and A.S. Karstaedt (2005) "HIV/AIDS and Antiretroviral Treatment Knowledge, Attitudes, Beliefs, and Practices in HIV-Infected Adults in Soweto, South Africa", *Journal of Acquired Immune Deficiency Syndromes* 38(2): 196-201.

National AIDS/STI Control Programme (2009) *2007 Kenya AIDS Indicator Survey: Final Report*. Nairobi: National AIDS/STI Control Programme.

National Statistical Office Malawi and ORC Macro (2005) *Malawi Demographic and Health Survey 2004*. Calverton, Maryland: NSO and ORC Macro.

Neequaye, A.R.; J.E. Neequaye and R.J. Biggar (1991) "Factors that Could Influence the Spread of AIDS in Ghana, West Africa: Knowledge of AIDS, Sexual Behavior, Prostitution, and Traditional Medical Practices", *Journal of Acquired Immune Deficiency Syndromes*, 4(9): 914-919.

Nicolosi, A.; M.L.C. Leite; M. Musicco; C. Aricci; G. Gavazzeni and A. Lazzarin for the Italian Study Group on HIV Heterosexual Transmission (1994) "The Efficiciency of Male-to- Female and Female-to-Male Transmission of the Human Immunodeficiency Virus: A Study of 730 Stable Couples", *Epidemiology* 5: 570-575.

Nnko, S.; J.T.J. Ties Boerma; M. Urassa; G. Mwaluko and B. Zaba (2004) "Secretive Females or Swaggering Males?: An Assesment of the Quality of Sexual Partnership Reporting in Rural Tanzania", *Social Science and Medicine* 59(2): 299-310.

Norman, L.R. (2003) "Predictors of Consistent Condom Use: A Hierarchical Analysis of Adults from Kenya, Tanzania and Trinidad", *International Journal of STD & AIDS* 14: 584-590.

Nzioka, C. (2001) "Perspectives of Adolescent Boys on the Risks of Unwanted Pregnancy and Sexually Transmitted Infections: Kenya", *Reproductive Health Matters* 9(17): 108-117.

O'Connor, M.L. (2001) "Men Who Have Many Sexual Partners before Marriage Are More Likely to Engage in Extramarital Intercourse", *International Family Planning Perspectives* 27(1): 48-49.

Orubuloye, I.O.; J.C. Caldwell and P. Caldwell (1997) "Perceived Male Sexual Needs and Male Sexual Behaviour in Southwest Nigeria", *Social Science and Medicine* 44(8): 1195-1207.

Parkhurst, J.O. and L. Lush (2004) "The Political Environment of HIV: Lessons from a Comparison of Uganda and South Africa", *Social Science and Medicine* 59(9): 1913-1924.

Parsitau, D.S. (2009) "Keep holy distance and abstain till he comes: Interrogating a Pentecostal Church's engagements with HIV/AIDS and the youth in Kenya", *Africa Today* 56: 45-54.

Parsons, T. (1951) "Illness and the Role of a Physician: A Sociological Perspective", *American Journal of Orthopsychiatry* 21(3): 452-460.

Patterson B.K.; A. Landay; J.N. Siegel; Z. Flener; D. Pessis; A. Chaviano and R.C. Bailey (2002) "Susceptibility to Human Immunodeficiency Virus-1 Infection of Human Foreskin and Cervical Tissue Grown in Explant Culture", *American Journal of Pathology* 161(3): 867-873.

Phillips, D.L. and K.J. Clancy (1972) "Some Effects of 'Social Desirability' in Survey Studies", *American Journal of Sociology* 77 (5): 921-940.

Philipson T. and R.A. Posner (1995) "The Microeconomics of the AIDS Epidemic in Africa", *Population and Development Review* 21(4): 835-848.

Pilcher C.D.; H. Chuan Tien; J.J. Eron; P.L. Vernazza,; S.Y. Leu; P.W. Stewart; L.E. Goh and M.S. Cohen (2004) "Brief but Efficient: Acute HIV Infection and the Sexual Transmission of HIV", *The Journal of Infectious Diseases* 189: 1785-1792.

Pogrebin, L.C. (1987) "Competing with Women" in Miner V. and H.E. Longino (eds.) *Competition: a Feminist Taboo*. New York: Feminist Press.

Poulin, M. (2007) "Sex, Money, and Premarital Partnerships in Southern Malawi", *Social Science & Medicine* 65: 2383-2393.

Quinn, T.C. and J. Overbaugh (2005) "HIV/AIDS in Women: An Expanding Epidemic", *Science* 308: 1582-1583.

Quinn, T.C.; M.J. Wawer; N. Sewankambo; D. Serwadda; C. Li; F. Wabwire-Mangen; M.O. Meehan; T. Lutalo and R.H. Gray for the Rakai Project Study Group (2000) "Viral Load and Heterosexual Transmission of Human Immunodeficiency Virus type I", *New England Journal of Medicine* 342: 921-929.

Reniers, G. (2008) "Marital Strategies for Regulating Exposure to HIV", *Demography*, 45(2): 417-438.

Reniers, G. and R. Tfaily (2008) "Polygyny and HIV in Malawi", *Demographic Research* 19(53): 1811-1830.

Rogers, E.M. (1995) *Diffusion of Innovations* (5th edition). New York: Free Press.

Rushing, W.A. (1995) *The AIDS Epidemic: Social Dimensions of an Infectious Disease*, Boulder, Col: Westview Press.

Rutenberg, N.; C. Kehus-Alons; L. Brown, K. Macintyre; A. Dallimore and C. Kaufman (2001) *Transitions to Adulthood in the Context of AIDS in South Africa: Report of Wave I.* Population Council.

Santelli, J.S.; N.D. Brener; R. Lowry; A. Bhatt and L.S. Zabin (1998) "Multiple Sexual Partners among US Adolescents and Young Adults", *Family Planning Perspectives* 30(6): 271-275.

Schelling T.C. (1971) "Dynamic Models of Segregation", *Journal of Mathematical Sociology* 1: 143-186.

Schelling, T.C. (1978) *Micromotives and Macrobehavior*. Nueva York: Norton.

Schelling, T.C. (1980) *The Strategy of Conflict*. Cambridge, MA.: Harvard University Press.

Scherer, C.W. and H. Cho (2003) "A Social Network Contagion Theory of Risk Perception", *Risk Analysis* 23: 261-267.

Schneider, H. (2002) "On the Fault-Line: The Politics of AIDS Policy in Contemporary South Africa", *African Studies* 61(1): 145-167.

Selikow, T.A.; N. Ahmed; Flisher, A.J.; C. Mathews and W. Mukoma (2009) "I Am Not a 'Umqwayito': A Qualitative Study of Peer Pressure and Sexual Risk Behavior among Young Adolescents in Cape Town, South Africa", *Scandinavian Journal of Public Health* 37(Suppl. 2): 107-112.

Sinding, S. (2005) "Does 'CNN' (Condoms, Needles, and Negotiation) Work Better than 'ABC' (Abstinence, Being Faithful, and Condom Use) in Attacking the AIDS Epidemic?", *Science* 31(1): 38-40.

Sloan N.M. and J.E. Myers (2005) "Evaluation of an HIV/AIDS Peer Education Programme in a South African Workplace", *South African Medical Journal* 95(4): 261-264.

Smith, D.J. (2006) "Love and the Risk of HIV: Courtship, Marriage and Infidelity in Southeastern Nigeria" in J. Hirsch and H. Wardlow (eds.) *Modern Loves: the Anthropology of Romantic Courtship and Companionate Marriage.* Ann Arbor: University of Michigan Press.

Smith, D.J. (2007) "Modern Marriage, Men's Extramarital Sex, and HIV-Risk in Southeastern Nigeria", *American Journal of Public Health* 97: 997-1005.

Smith, K.P. and S.C. Watkins (2005) "Perceptions of Risk and Strategies for Prevention: Responses to HIV/AIDS in Rural Malawi", *Social Science & Medicine* 60: 649-660.

Stoneburner, R.L. and D. Low-Beer (2004) "Population-Level HIV Declines and Behavioral Risk Avoidance in Uganda", *Science* 304: 714-718.

Sultana, A.; A.M. Kavinya; G. Kwalapu and T. Mhone (1990) "Family Life Issues as Viewed by Men, Women, and Teenagers in Malawi". Unpublished transcripts on focus group discussions conducted under the Family Life Education Project. Lilongwe, Malawi: UNFPA.

Takyi, B.K. and C.L. Broughton (2006) "Marital Stability in Sub-Saharan Africa: Do Women's Autonomy and Socioeconomic Situation Matter?", *Journal of Family and Economic Issues* 27(1): 113-132.

Takyi, B.K. and S.O. Gyimah (2007) "Matrilineal Family Ties and Marital Dissolution in Ghana", *Journal of Family Issues* 28(5): 682-705.

Tavory, I. and A. Swidler (2009) "Condom Semiotics: Meaning and Condom Use in Rural Malawi", *American Sociological Review* 74(2): 171-189.

Tawfik, L. (2003) *Soap, Sweetness, and Revenge: Patterns of Sexual Onset and Partnerships amidst AIDS in Rural Southern Malawi*. Unpublished PhD Dissertation. Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD.

Tawfik, L. and S.C. Watkins (2007) "Sex in Geneva, Sex in Lilongwe, and Sex in Balaka", *Social Science & Medicine* 64(5): 1090-1101.

Thaler, R.H. and C.R. Sunstein (2008) *Nudges: Improving Decisions about Health, Wealth, and Happiness*. New Haven, CT: Yale University Press.

Thomsen, S.C.; M. Stalker; C. Toroitich-Ruto; B.M. Ndugga and P. Mwarogo (2004) "Fifty Ways to Leave Your Rubber: How Men in Mombasa Rationalize Unsafe Sex", *Sexually Transmitted Infections* 80: 430-434.

Trussell, J.; A.M. Lalla; Q.V. Doan; E. Reyes; L. Pinto and J. Gricar (2009) "Cost Effectiveness of Contraceptives in the United States", *Contraception* 79: 5-14.

UNAIDS (2008) *Report on the Global AIDS Epidemic*. Geneva: UNAIDS/WHO.

UNAIDS and WHO (2007) *AIDS Epidemic Update*. Geneva: UNAIDS/WHO.

UNAIDS and WHO (2009) *UNAIDS Annual Report 2008: towards Universal Access*. Geneva: UNAIDS/WHO.

Van Campenhoudt, L. and M. Cohen (1997) "Interaction and Risk-Related Behaviour: Theoretical and Heuristic Landmarks" in L. Van Campenhoudt; M. Cohen; G. Guizzardi and D. Hausser (eds.) *Sexual Interactions and HIV Risk. New conceptual perspectives in European research*. London: Taylor & Francis.

Vanberg, V.J. (2002) "Rational Choice vs. Program-Based Behavior: Alternative Theoretical Approaches and Their Relevance for the Study of Institutions", *Rationality and Society* 14: 7-54.

Varga, C.A. (1997) "Sexual Decision-Making and Negotiation in the Midst of AIDS: Youth in KwaZulu-Natal, South Africa", *Health Transition Review* 7 (Suppl. 3): 45-67.

Versteeg, M. and M. Murray (2008) "Condom Use as Part of a Wider HIV Prevention Strategy: Experiences from Communities in the North West Province, South Africa", *Journal of Social Aspects of HIV/AIDS* 5(2): 83-93.

Wabwire-Mangen F.; M. Odiit; W. Kirungi; D.K. Kisitu; J.O. Wanyama (2009) *Uganda: HIV Modes of Transmission and*

Prevention Response Analysis. Kampala: Uganda National AIDS Commission.

Watkins, S.C. (2004) "Navigating the AIDS Epidemic in Rural Malawi", *Population and Development Review* 30(4): 673-705.

Watkins, S.; P. Behrman; H-P. Kohler and E.M. Zulu (2003) "Introduction to 'Research on Demographic Aspects of HIV/AIDS in Rural Africa", *Demographic Research,* Special Collection 1(1): 1-30.

Watts, C.H. and R.M. May (1992) "The Influence of Concurrent Partnerships on the Dynamics of HIV/AIDS", *Mathematical Biosciences* 108(1): 89-104.

Wawer, M.J.; R.H. Gray; N.K. Sewankambo; D. Serwadda; X. Li; O. Laeyendecker; N. Kiwanuka; G. Kigozi; M. Kiddugavu; T. Lutalo; F. Nalugoda; F. Wabwire-Mangen; M.P. Meehan and T.C. Quinn (2005) "Rates of HIV-1 Transmission per Coital Act, by Stage of HIV-1 in Rakai, Uganda", *The Journal of Infectious Diseases* 191: 1403-1409.

Wellings, K.; M. Collumbien; E. Slaymaker; S. Singh; Z. Hodges; D. Patel and N. Bajos (2006) "Sexual Behavior in Context: A Global Perspective", *Lancet* 368: 1706-1728.

Westercamp, N.; C.L. Matsson; M. Madonia; S. Moses; K. Agot; J.O. Ndinya-Achola; E. Otieno, N. Ouma and R.C. Bailey (2010) "Determinants of Consistent Condom Use Vary by Partner Type among Young Men in Kisumu, Kenya: A Multi-Level Data Analysis.", *AIDS and Behavior* 14(4): 949-959.

White, R.C.; C. Hall and B. Wolff (2007) "Period and Cohort Dynamics in Fertility Norms at the Onset of the Demographic Transition in Kenya 1978-1998", *Journal of Biosocial Science* 39: 443-454.

Willis, P.E. (1977) *Learning to Labor: How Working Class Kids Get Working Class Jobs*. New York: Columbia University Press.

Wilson, D. and J. de Beyer (2006) "Male Circumcision: Evidence and Implications" in HIV/AIDS M&E –Getting Results, World Bank Global HIV Program. Available at:

http://siteresources.worldbank.org/INTHIVAIDS/Resources/375798-1132695455908/M&EGR_MaleCircumcision_Mar31.pdf, July 6th, 2010.

Wolffers, I., I. Fernández, S. Verghis, M. Vink (2002) "Sexual Behavior and Vulnerability of Migrant Workers for HIV Infection", *Culture, Health & Sexuality* 4(4):459-473.

World Bank (2006) *Malawi at a Glance*. World Bank Country Profile. Available at http://devdata.worldbank.org/AAG/mwi_aag.pdf. Accessed December, 2009.

Yang, X. (2006) "Temporary Migration and HIV Risk Behaviors in China", *Environment and Planning A* 38: 1527-1543.

Yeatman, S.E. (2009) "The Impact of HIV-Status and Perceived Status on Fertility Desires in Rural Malawi", *AIDS and Behavior* 13 (Suppl.1): 12-19.

Zellner, S.L. (2003) "Condom Use and the Accuracy of AIDS Knowledge in Côte d'Ivoire", *International Family Planning Perspectives* 29(1): 41-47.

Zulu, E.M. and G. Chepngeno (2003) "Spousal Communication about the Risk of Contracting HIV/AIDS in Rural Malawi", *Demographic Research*, Special Collection 1(8): 247-278.