POLYGYNY AND WOMEN'S HEALTH IN RURAL MALI

R. M. BOVE, EMILY VALA-HAYNES and CLAUDIA VALEGGIA

Journal of Biosocial Science / *FirstView* Article / March 2013, pp 1 - 24
DOI: 10.1017/S0021932013000059, Published online: 12 March 2013

J. Biosoc. Sci., page 1 of 24, © Cambridge University Press, 2013
doi:10.1017/S0021932013000059

POLYGYNY AND WOMEN'S HEALTH IN RURAL MALI

R. M. BOVE*[1], EMILY VALA-HAYNES† AND CLAUDIA VALEGGIA‡

**Harvard Medical School, Boston, MA, USA, †Population Studies Center, University of Pennsylvania, Philadelphia, PA, USA and ‡Department of Anthropology, University of Pennsylvania, Philadelphia, PA, USA*

Summary. Women's social networks and social power are increasingly seen as important factors modulating their health in sub-Saharan Africa. Polygyny, a common marital structure in many societies, mediates important intra-household relationships by requiring both competition and co-operation among co-wives. Using mixed methods, semi-structured questionnaires were administered to 298 women aged 15–84 living in the Kolondiéba region of rural Mali in 1999, and supplemented by detailed interviews with 40 women. Three categories of outcome were explored: illness experience, therapeutic itinerary and social support received. Quantitative data were analysed using regression analysis and qualitative data using a grounded theory approach. In quantitative analyses, controlling for age and household wealth index, senior wives were less likely to be escorted to a healer by their husbands during illness than were junior wives or monogamous women. Polygynous women were also less likely to obtain a treatment for which there was a monetary fee. Fewer than one-third of polygynous women reported the assistance of a co-wife during illness in any given task. In qualitative analyses, women further related varied mechanisms through which polygyny impacted their health trajectories. These ranged from strongly supportive relationships, to jealousy because of unequal health or fertility, bias in emotional and material support provided by husbands, and accusations of wrong-doing and witchcraft. This study highlights the need for more prospective mixed methods analyses to further clarify the impact of polygyny on women's health-related experiences and behaviours in sub-Saharan Africa.

Introduction

Polygyny in many sub-Saharan African countries remains a normative marital system that continues to reinvent itself in light of migration, urbanization, female education and other demographic changes (Lesthaeghe *et al.*, 1989; van de Walle, 2005). Although it

[1] Corresponding author. Email: rbove@partners.org

has long been recognized that polygyny mediates women's intra-household dynamics in important ways, its potential impact on women's health remains under-explored.

In sub-Saharan Africa, where women's development indices lag behind those of the rest of the world, women's ability to access key resources and to effect health-related decisions by using wealth, social networks and social power, may positively impact their health and that of their children. Over the past two decades, the important role of social mediators of women's health, including both the size and the composition of women's networks, has been emphasized in ethnographic and demographic studies (Pick & Obermeyer, 1996; Haddad *et al*., 1997; Adams *et al*., 2002; Madhavan, 2002; Simon *et al*., 2002; Madhavan & Adams, 2003). Thus, women's social connectedness has been linked to such outcomes as nutritional status (Ice *et al.*, 2011; Shayo & Mugusi, 2011), end-of-life care (Selman *et al.*, 2011) and protection against cognitive decline (Gureje *et al.*, 2011).

Polygyny, by modulating women's social power, may be an important social mediator of women's health in sub-Saharan Africa. In fact, polygyny exemplifies the 'co-operative conflict' paradigm of household dynamics (Sen, 1990), requiring co-operation among co-wives in productive (domestic, agricultural) and reproductive (conjugal, childrearing) arenas, all the while placing them under the authority of a husband for whose attention and parental investment co-wives are in direct competition (Dorjahn, 1988; Madhavan, 2002). Specifically, polygyny may modulate women's reproductive health, including vulnerability to sexually transmitted infections (Adeokun & Nalwadda, 1997; Caldwell *et al*., 1997; Morris & Kretzschmar, 1997; Lagarde *et al.*, 2001); fertility through modulation of coital frequency, the duration of postpartum sexual abstinence and breast-feeding and hence inter-birth intervals, and secondary sterility (Murdock, 1967; Bongaarts, 1978; Lesthaeghe, 1989; Bledsoe, 1990; Ferraro, 1991; Gage-Brandon, 1992; Imade *et al.*, 1993; Larsen, 1995; Amankwaa, 1996; Gibson & Mace, 2007); and infant survivorship (Borgerhoff Mulder, 1988, 1992; Strassmann, 1997; Amey, 2002; Hadley, 2005; Gyimah, 2009). It may also be a risk factor for intimate partner violence (Jewkes *et al*., 2002; Karamagi *et al.*, 2006; Uthman *et al*., 2010) and mental health problems (Mbassa Menick & Sylla, 1996; Donkor & Sandall, 2007). Interpersonal factors affecting the relative importance of polygyny in shaping health outcomes include a weaker conjugal bond and barriers to conversations surrounding reproductive health between spouses in polygynous unions; male behaviour (including egalitarianism, favouritism or violence); women's respect for a codified senior/junior co-wife hierarchy; and the degree of competition and potential for economic or childrearing co-operation between co-wives. The relative importance of polygyny also varies based on local gender norms, a woman's parity, position in the life cycle and her social power (including employment and access to sons) (Wittrup, 1990; Gwanfogbe *et al.*, 1997; Madhavan, 2002; Jankowiak *et al*., 2005).

As of 2006, in rural Mali 45% of married women aged 15–49 years and 27% of married men aged 15–59 years were married polygynously (CPS/MS *et al*., 2007). In this resource-poor setting, the effect of social networks and concomitant support is probably especially critical to the care that women receive. There is a relative wealth of ethnographic evidence from this region regarding the opportunities for collaboration and competition between polygynous women (Madhavan, 2002), as well as the impact of women's social power and social networks on their access to treatment-related resources

for their children (Dettwyler, 1992; Adams & Castle, 1994; Adams *et al*., 2002, 2006). An appreciation of the impact of social modulators on women's own health outcomes remains anecdotal or suggestive. Thus, given its high rates of polygyny and documented social modulators of women's status, Mali represents an ideal setting to explore the as yet scarcely documented relationship between polygyny and women's health.

This paper presents data from mixed methods research conducted in rural Mali in 1999, including 298 questionnaires administered to women and 40 in-depth interviews. The questionnaires centred around recent illness events, focusing on three themes: illness experience, therapeutic itineraries and social support received. Because quantitative research on polygyny can be hampered by a number of covariates such as women's age, education, fertility and position within the life cycle, the fluidity of polygynous marriages and the fact that most marriages may at any moment switch between monogamy and polygyny (Bledsoe, 1990; Blanc & Gage, 2000), rich qualitative data are also emphasized. These mixed methods allow for an in-depth examination of the ways in which polygyny might mediate women's access to therapeutic care and social support during illness in rural Mali.

Methods and Data

Study population

The Kolondiéba *cercle* is an administrative subdivision of the Sikasso region of Mali, 280 km south of Mali's capital, Bamako. Sikasso neighbours the republics of Guinea, Cote d'Ivoire and Burkina Faso. The Kolondiéba *cercle* is composed of an urban commune, Kolondiéba town, as well as eleven surrounding communes consisting of small towns and villages, with a total population in 2009 of 200,000 people (Institut National de la Statistique, 2009). Villages consist of concessions of traditional huts built from mud bricks for sleeping and cooking, with thatched roofs, and surrounded by agricultural fields. There is no running water or electricity, and most water is obtained from wells. Rainfall and soil are adequate relative to the rest of Mali; the main subsistence crops are millet, corn, rice, peanuts and sorghum, and the main cash crop is cotton. The staple diet is millet or rice with sauce (peanut, tomato/onion, okra) and occasional meat. Most villagers are of Bambara (Bamanan) or Senoufo ethnicity, and while nominally Muslim, they retain features of traditional animist religion. Marriages are lineage exogamous but endogamous within the village or region, and are usually patrilocal. Polygyny is prevalent, and inheritance patterns are patrilineal. Men are usually agriculturalists with occasional petty trade. Women usually work in the fields and occasionally sell goods at market. According to the 2001 Demographic and Health Surveys for the Sikasso region of Mali, 86% of women aged 15–49 had never been to school, and 52% of the married women aged 15–49 were married polygynously (CPS/MS *et al*., 2002). During the 1990s, the non-governmental organization Save the Children (USA) developed a strong community development programme in Kolondiéba targeting sanitation, education, agriculture, female development and health (Poulton, 1992). During illness episodes, villagers can select from village traditional healers, midwives and religious healers (*marabouts*); Save the Children health and sanitation agents within their commune; or health agents in the *cercle*'s only hospital in Kolondiéba town.

Data collection

Permission to conduct this study was obtained from the *Centre d'Etudes et de Recherches sur la Population pour le Développement* (CERPOD), and from Mali's *Centre National de la Recherche Scientifique et Technologique* (CNRST). Surveys and semi-structured interviews were conducted during October and November 1999 in six villages in the Kolondiéba *cercle*. This ensured that the data collection followed the month of highest rainfall and greater morbidity, September, and captured illnesses during this period. Six villages were selected for inclusion in this study from CERPOD's longitudinal demographic project, the *Observatoire de Kolondiéba*. The data collection structure and purpose of the *Observatoire* have been described previously (McKinney Sow *et al.*, 1999; Traoré *et al.*, 2002). Three communes were selected in which a community health centre had been built by Save the Children. Within each commune, one village within 5 km and one greater than 15 km from the health centre were selected. Lists of all women aged over 15 years were generated from the *Observatoire* database for each village. Women were then grouped into three age categories (15–25, 25–50, 50+). Then, equal numbers (approx 15–20) were chosen using a random number generator from each age category.

Health-related data were collected using a mixed-methods 'concurrent triangulation strategy' as described by Creswell (2008), in order to draw upon the strengths of concurrently collected quantitative and qualitative research. Semi-structured questionnaires were translated from French to Bambara by four Malian interviewers trained in demographic research through CERPOD. Revisions were made to ensure cultural sensitivity. Prior to the interviews, permission was sought and granted from the head of each village. Both the female subject and the head of her household consented to individual interviews. Eighteen women refused to fill out a questionnaire for reasons including time, privacy and shyness, and 298 women responded to questionnaires. Women were asked a series of questions regarding the occurrence of illness symptoms in the prior three months: (1) description of symptoms; (2) timing of onset; (3) use of home remedies (self-medication or plants) and/or resort to outside treatment; and (4) sources of financial, emotional and practical support received during illness. To quantify morbidity, subjective/perceived symptoms were recorded rather than objective signs or medical diagnoses (Peron & Strohmenger, 1985), both because detailed medical observations were not available and to better capture women's personal experiences and interpretations of illness. Whenever feasible, interviewers also recorded detailed comments and quotations from any additional responses made by women during these semi-structured interviews.

In addition to surveys, 40 of the questionnaires were immediately followed by detailed qualitative interviews, in order to gather more detailed information about the nuances of symptoms and illness trajectories that was not possible to capture with the quantitative methodology. Each day the lead author alternated following interviewers, and consecutively interviewed women assigned to the given interpreter. Because of strong social pressures for women not to reveal personal feelings about marital relationships that might undermine their commitment to the established social order (Lesthaeghe, 1989; Wittrup, 1990), care was taken not to ask leading questions but rather to explore relationships introduced by the respondents themselves. The responses were recorded in French and translated into English by the lead author.

Personal, marital and household characteristics were obtained and verified from CERPOD records including (a) age, ethnicity, religion, migration, (b) marital status, including marital rank (senior if first wife, junior if second, third or fourth wife) if polygynous, and (3) household composition, water sources, latrines, presence of household help.

Data analysis

Quantitative data were analysed using STATA version 11. First, socio-demographic characteristics were summarized. Because the respondents had been sampled from predetermined age categories with the intention of increasing the number of polygynous women, the age distribution was purposefully different from a sample representative of a growing population. Accordingly, age was controlled for in every regression model as it probably increases vulnerability to disease.

For quantitative analyses of polygyny, single women and widows were excluded due to their small numbers. Because of the importance of a rank hierarchy among co-wives, women who were married polygynously were separated into senior wife (if they were the first wife in their current marriage) or junior wife (if they were the second, third or fourth wife).

A household wealth index was then calculated. This index is a composite variable modelled on the DHS wealth index, which includes the construction material of the house (corrugated metal or mud), water source (traditional or drilled well), sanitation type (latrine inside or outside of house) and whether there was a radio, moped or bicycle in the house. All available variables on asset ownership and housing characteristics were considered, and a principal components analysis was conducted to determine the weights of each variable based on the technique outlined by Filmer & Pritchett (2001). The resulting wealth index scores were split into quartiles.

The primary outcomes of interest were (1) report of illness in the past three months, (2) therapeutic itinerary (type and cost of healer, escort to healer) and (3) social support received during illness. Additional detailed outcomes, summarized in Table 2, included description of symptoms, whether illness was related to reproductive health, principal difficulty associated with the illness, timing of onset and time lapse between onset and decision to seek medical attention, use of home remedies (self-medication or plants) and/or resort to outside treatment, and sources of financial, emotional and practical support received during illness.

One of the principal aims of this paper was to determine differences in health system usage, health outcomes and social relationships among women of three different marital types (monogamous, polygynous senior wife, polygynous junior wife). For each health or social variable of interest, ordinary least squares (for continuous outcome variables) or logistic (for dichotomous categorical outcome variables) regressions were run using models that contained age, household wealth index and marital type. Qualitative health-related data (including transcripts from the 40 detailed interviews, as well as 69 detailed comments and notes taken by interviewers during the semi-structured interviews) were analysed using QSR NVivo 7 software. Codes were developed using a grounded theory approach (Glaser & Strauss, 1967). The authors read through all transcripts and identified open codes based on line-by-line analysis of emerging themes. Authors then met to

discuss relationships among open codes and create selective codes of larger concepts, such as ecological context, reproductive status, polygyny and social support. Although all data were collected before analysis, the inductive and deductive elements of the grounded theory approach allowed for a cyclical process between theory and empirical data until theoretical saturation could be reached. Using the selected codes, two authors coded the data independently and discussed all cases of inconsistency. Approximately 30% of the transcript and codes were reviewed, and final inter-coder reliability was over 90%.

Results

The majority of respondents were Bamanan, Muslim, and had never lived outside of Kolondiéba *cercle* (Table 1). Most of the 298 women were married; ten respondents were widowed and one was single. Women ranged in age from 15 to 84. Fifty-seven per cent of the women in the sample were married polygynously, with approximately even numbers of senior and junior wives.

Table 1. Descriptive characteristics of respondents, Kolondiéba *cercle*, 1999

Variable	All ($N = 298$)	Monogamous ($N = 101$)	Polygynous-Senior ($N = 72$)	Polygynous-Junior ($N = 79$)
Marital status (%)				
Single	0.4			
Widowed	3.8			
Monogamous	38.4			
Polygynous-Senior	27.4			
Polygynous-Junior	30.0			
Age group (%)				
15–24	20.6	29.0	8.6	27.9
25–49	43.8	46.0	48.6	48.1
50+	35.6	25.0	42.9	24.1
Mean age in years (SD)	41.8 (16.5)	37.0 (15.9)	46.6 (14.0)	36.5 (14.1)
Ethnicity (%)				
Bamanan	74.2	80.0	72.9	71.8
Peul (Fulbe)	11.3	6.0	12.9	11.5
Senoufo	10.3	12.0	8.6	10.3
Malinke	2.8	2.0	4.3	3.9
Other	1.4	0	1.4	2.6
Proportion Muslim (%)	99.3	100.0	100.0	97.5
Ever lived outside Kolondiéba (%)	12.0	14.0	11.4	13.9
Pregnant in past 2 years (%)	48.9	61.3	37.5	45.0
Household wealth index quartile (%)				
First (lowest)	25.2	25.3	32.9	21.1
Second	38.5	40.4	34.3	32.9
Third	12.6	14.1	7.1	15.8
Fourth (highest)	23.8	20.2	25.7	30.3

Senior polygynous wives had a mean age approximately 10 years higher than both junior polygynous and monogamous wives and were more concentrated in the two extremes of the wealth quartiles than monogamous women. Both polygynous junior and senior wives had higher proportions of individuals in the wealthiest quartile than monogamous women. Polygynous junior wives had the largest portions of individuals in the two highest quartiles by nearly 10 percentage points. More monogamous than polygynous women reported a pregnancy in the prior 2 years; however, this and all other bivariate differences in Table 1 were rendered insignificant in auxiliary models that controlled for age.

For each of the three types of outcomes assessed (illness symptoms, therapeutic trajectories and social support received), quantitative data were supplemented by qualitative data, which provided a better understanding of the ways in which polygyny shapes women's illness experiences. In each of these themes, polygyny emerged as a powerful thread.

Illness symptoms in prior three months

Approximately half of the respondents reported an illness in the prior three months (Table 2). The analysis was limited to married women, who represented 96% of the sample. Of these women, one-third reported symptoms tied to their reproductive health. Approximately half used home therapies to treat their symptoms. Half consulted outside healers, approximately half of which were biomedical. One-third reported symptoms lasting over one month before they sought treatment.

Illness attributions. Women who reported a recent illness revealed a world view where illnesses were anchored not only in their economic and ecological environment, but also in their social, spiritual and supernatural contexts. Thus, they provided a broad range of explanations for their illnesses that included ecological (arid climate, rainy season, hard agricultural work), economic (extreme poverty, migration of young adults) and medical (old age, high infant and child mortality rates) hardships. Specifically, they accepted that 'old age itself is an illness', as part of the natural life cycle but for which they also expected support and relief from younger generations:

> I am about 70 years old, and with my age and the end of my periods, I think that it is normal that problems should come up. With my births I had fewer problems. There is also the stopping of physical activities. I hardly move around anymore, only to go to the mosque, which is 200 metres from my home. Also when we push ourselves when we are younger, when we become adults it's like the sum of all our past efforts that add up and manifest themselves. (72, polygynous)

Only a few provided strictly medical explanations, such as post-operative pain or visual loss, or post-menopausal headaches and mood changes. Conversely, women cited washing with leaves, roots and bark as sources of good health.

A substantial number of women attributed their illness to supernatural phenomena, such as communal (e.g. violation of sacred prohibitions) and interpersonal social (e.g. adultery) transgressions:

> If you don't respect taboos, someone can cast a spell on you. (33, polygynous)

Table 2. Therapeutic itineraries (%), Kolondiéba *cercle*, 1999

Variable	Monogamous ($N = 101$)	Polygynous-Senior ($N = 72$)	Polygynous-Junior ($N = 79$)
Ill (%) in past 3 months, *n* (%)	42 (44.5)	42 (58.3)	41 (53.2)
Reproductive health related (%)	37.8	26.2	33.3
Tried home therapy (%)	55.6	50.0	54.8
Sought outside treatment (%)	56.8	54.8	40.5
Biomedical healer (%)	63.0	45.8	54.2
Reaction time (%)			
Within a week	56.5	54.6	40.9
Within a month	13.0	18.2	18.2
Month or longer	30.4	27.3	40.9
Principal difficulty (%)			
Nothing	42.9	28.6	19.5
Pain	14.3	21.4	19.5
Work interruption	7.1	11.9	17.1
Impedes daily activity	26.2	33.3	29.3
Other	9.5	4.8	14.6
Reason for choice of treatment (%)			
Money	29.4	13.3	23.1
Efficacy	52.9	60.0	53.9
Healer a relative	5.9	20.0	15.4
Other	11.8	6.7	7.7
Decision-maker for treatment sought (%)			
Self	43.5	47.8	52.4
Husband	43.5	26.1	38.1
Other	13.0	26.1	9.5
Escort to healer (%)			
No one	38.1	52.4	52.6
Husband	38.1	9.5	36.8
Son	23.8	23.8	10.5
Other	0	14.3	0
Payer of treatment (%)			
Self	11.8	7.1	26.7
Husband	70.6	42.9	53.3
Natal family	11.8	28.6	0
Agnate family	5.9	14.3	20.0
Other	0	7.1	0
Cost of healer (%)			
Nothing	39.1	65.0	61.1
Less than 1000 CFA francs	43.5	30.0	33.3
1000 CFA francs or more	17.4	5.0	5.6

For example, the potential consequences cited for clearing a sacred wood near one of the villages included mental illness, and an increase in mosquitoes and malaria:

> There is a forest in Bohi whose wood one must not cut. If you take its wood, there will be too many mosquitoes in the village. There are also two wells to the edge of which no-one must venture with clothes. A *griot* [bard] must not see these wells; if he does he will become blind. (41, monogamous)

In a background of poverty, low access to medical care and limited biomedical explanations for illness, women often attributed their symptoms to the direct harm, witchcraft and poisonings of others:

> There are many problems of social cohesion in these villages, which leads to many spells being cast. (51, polygynous)

Commonly cited modes of 'sending' illnesses included poisoning of food, and asking a *marabout* (sorcerers in Muslim Africa believed to have supernatural powers) to write a spell in chalk on a board, pour water over the chalk and collect it, and then further process this water into a spell. Women who felt they were victims of witchcraft then had to work against spells by asking for ritualized protection from traditional healers and *marabouts*.

Within this context of supernatural agency, polygyny figured as an important source of interpersonal conflict and agents of disease. Four women explicitly referred to poisoning by their mothers' co-wives, which resulted in either infertility or death of the victims. In general, accused co-wives were believed to be jealous, usually of imbalances in the number of offspring:

> When I was younger, my mother went on a trip and left me with her co-wife. This one gave me millet porridge with poison in it. My younger brother came back from the fields and she gave it to him. After he'd finished, he had stomach aches and even before my father had returned from the fields, my brother had died. My mother's co-wife went to call my father in the fields. The father asked her what his son had eaten, and she answered the millet porridge. He took this to a sorcerer, who looked at it and saw that it was poisoned. (27, monogamous)

Reproductive health. In this pronatalist community, where one-third of respondents reported symptoms related to their reproductive healthy, several themes emerged.

(i) *Child mortality.* Women continue to experience high rates of child mortality. Nine women reported that child mortality was a major source of emotional and social suffering and economic hardship. They perceived their children's mortality as a reflection of their own poor health. Some women attributed their children's mortality to low paternal investment and to witchcraft. Others worried that their children's mortality might create distance or discord between themselves and their husbands:

> I have had twelve pregnancies, only six children are left. It is a fact of God that I lost them. Some died once they were grown up. I am the first of my husband's two wives. Of course we get along; there is no favourite. We both prepare dinner. There is no problem between us and I do not accuse anyone for the deaths of my children. (40, polygynous)

(ii) *Pregnancy*. Interestingly, despite the high prevalence of pregnancy in the younger groups of women, few women reported somatic symptoms or distress related to their

pregnancy, perhaps because of the welcome life change. Those who experienced symptoms welcomed them as normal:

> This is my third pregnancy; I am suffering, but I accept it as normal. (23, monogamous)

(iii) *Infertility*. Infertility, however, was a major concern for women, as women's primary source of social status in their households arose from their childbearing role. Facilitating women's fertility is a primary role of husbands in marriage, and failure to do so was seen as one of the main socially sanctioned bases for women to complain about their husbands:

> I only have two children, two girls. One is with her uncle and one is in the 6th year in school. My husband's [reproductive tract] does not work. He can satisfy me but not have any children. That is why I am his only wife: he cannot remarry. I wanted him to give me to one of his younger brothers so that I might be satisfied in my childrearing desires but he refused out of jealousy. (30, monogamous)

Predictably, the presence of more fertile co-wives exacerbated women's distress at their own limited childrearing:

> Women older than me are still menstruating and becoming pregnant. . . . My co-wives are having children while I am not, it is hard. (33, polygynous)

(iv) *Menopause.* Women attributed a range of symptoms to menopause, including headaches, mood changes, fatigue and accelerated ageing. Others reported that the cessation of their menses had occurred without any particular symptoms. Approximately half of women who discussed menopause felt that this had occurred at an appropriate time in their lives, and that it was a welcome transition, signalling a retirement from the more tiring aspects of women's work, and leading to positive changes, including the ability to rest more, pray more and to enjoy new responsibilities and respect in their household:

> I was menopaused about 10 years ago. I stopped cycling, and I thought that I was pregnant. Then I realized that I had stopped for good. It all depends on God. When I stopped I got fatter, my spirit was tranquil because when you stop cycling and you are not the right age you think that you are ill. But I was the right age when I stopped. Plus, periods prevent you from praying, so I am happier now. Plus I was happy because before menopause I had a lot of children to worry about, now I do not. (52, monogamous)

(v) *Social menopause*. Interestingly, menopause referred not only to the cessation of menses, but to a life change after which sexual relations with a husband may cease, and a woman is able to 'rest' and enjoy the assistance of daughters-in-law, daughters and junior co-wives available in her household. Thus, the statement 'I am no longer cooking' described the cessation of conjugal duties, both in terms of food preparation and sexual relations. As such, menopause represents a behavioural, social transition parallel to the endocrine transition.

This transition could also be precipitated by changes in a woman's family environment. When a woman's daughters-in-law move into her household, or her own daughter begins childbearing, she usually stops bearing children of her own, shifting her reproductive efforts to a more grandmaternal role. Continuing to bear children after a daughter or

daughter-in-law started might be seen as 'unseemly'. For some women this occurs when their husband dies, although it is common for them to remarry, including the husband's brother (the levirate).

Another commonly cited trigger for a social 'menopausation' was loss of interest in women by their husbands, often coincident with polygyny, and which was interpreted as a form of sexual abandonment:

> My husband forced me to be menopaused. I am the first wife, the second wife is the favourite one. When I was still cooking he would hide at his favourite's and only return late in the night because otherwise she would scold him. I could not digest this fact because like her I was married to him as well. Then eventually he stopped coming to me. The family did not react to this situation. Now I place my trust in God. My children do not say anything for fear of being cursed. (38, polygynous)

Similarly:

> When I was 35 I was menopaused. My husband took another wife and completely left me. I couldn't sleep, I spent my nights crying, I had many worries, sometimes I couldn't eat, because I wasn't old enough to be menopaused. I was sad about the new bride and my husband, and I couldn't have any more kids since we had no more sexual relations. I stopped seeing my period when I was 40 because of *bobodima*. Now I am 60 and I don't worry about my husband or my co-wife anymore, I have forgiven them and I don't really care anymore. (60, polygynous)

Therapeutic itineraries

Healers were chosen mainly for their perceived efficacy for the given symptoms, as well as for their cost. In almost half of the cases, women selected their healer themselves, and in over one-third of cases the husband selected the healer. Similarly, approximately half of women went to their healer alone, and others were accompanied either by their husband or by their son. Husbands paid for a majority of treatments, and the respondents themselves paid for up to one-third of treatments.

There were few statistically significant differences between monogamous and polygynous women (Table 3). Controlling for age and household wealth quartile, monogamous women were more likely to be escorted to a healer by their husbands compared with polygynous senior wives. While the odds ratio (OR) for polygynous junior wives was not statistically significant, it is in the expected direction, with junior wives receiving more assistance than senior wives. Women in the middle age category (25–49) were more likely to be escorted to a healer by their husbands than were younger women. There was no significant difference between senior and junior polygynous women in how much was spent on a healer's services. These categories were therefore combined and the regression run as monogamous vs *all* polygynous women. Controlling for age and household wealth quartile, polygynous women were 59% less likely to pay for a healer (OR, 0.41; $p = 0.12$).

As borne out in the quantitative data, many women reported that their choice of healer depended largely on their cost:

> I have no money and neither does my husband, so I have never gone to a doctor.

Table 3. Logistic regression results (odds ratios), Kolondiéba *cercle*, 1999

Variable	Escort to healer (0 = Other, 1 = Husband)	Pay for a healer (0 = No, 1 = Yes)	Have friend(s) (0 = No, 1 = Yes)
Marital status			
Monogamous	7.98** (8.37)	2.56 (1.77)	3.67** (2.10)
Polygynous-Senior	–	–	–
Polygynous-Junior	3.84 (3.99)	1.08 (0.790)	2.01 (1.08)
Age group			
15–24	–	–	–
25–49	9.95** (9.63)	0.82 (0.63)	1.31 (0.85)
50+	0.46 (0.62)	0.86 (0.69)	0.57 (0.37)
Household wealth quartile			
Lowest	–	–	–
Second	1.18 (1.06)	0.60 (0.38)	6.32*** (3.69)
Third	0.17 (0.24)	0.36 (0.32)	2.67 (2.05)
Fourth (highest)	1.92 (2.15)	2.33 (2.33)	2.29 (1.31)
N	61	61	121

Numbers in parentheses are standard errors.
Source: authors' calculations of Kolondiéba *cercle* survey data, 1999.
**$p < 0.05$; ***$p < 0.01$.

By far the most important social mediator of the therapeutic itinerary, described by most women, was a husband. According to most respondents, a husband carried the primary responsibility for them during their illness. He was expected to provide advice regarding the illness, as well as financial support for treatments. This aspect of the traditional husband–wife role was felt to derive from women's value to their husbands in the productive (agricultural work and other) and reproductive arenas, and hence a man's commitment to maintaining his wives' health. As a 63-year-old polygynous woman said:

> A woman's health is her husband's responsibility because in our times, a woman's health increased her husband's productivity.

In addition to their husbands, women often felt more comfortable discussing health-related matters with other proxies for their husband, such as a trusted brother-in-law, whom they might perceive as either less invested, less embarrassed or more knowledgeable about health topics.

For women without husbands, a father or son was responsible of seeking care for them during illness. In the absence of these male figures, then:

> If you are a widow, you fend for yourself.

Or:

> If a woman gets sick it's her husband's responsibility, unless she has no husband and then it's Allah's duty.

Consequently, the death of a husband carried at times severe consequences for women's livelihood and well-being, as they depended almost entirely on their children or on the goodwill of their agnatic or natal kin.

A few women provided positive examples of their husbands' impact on their health, even after loss of productivity on the women's part due to age or disease. Husbands helped by providing advice, garnering the material support of their families to pay for treatments and accompanying women to their healers. In addition, husbands could request a redistribution of roles in the household to allow a sick wife to rest.

However, there were many examples where women felt that their husbands did not provide adequately for them during illness. Sometimes, this may have simply represented a whim:

> I have never tried a health centre, because they can't cure this kind of illness. Anyway, I have no money even if I wanted to go. The choice depends on my husband, and he doesn't want me to go to the dispensary because he already has children, so he doesn't take treatments for my infertility too seriously. (30, polygynous)

Cited factors associated with low marital support included decreased investment in women as they aged or became infertile, decreased emotional bond with wives inherited through the levirate and/or preferential treatment of a co-wife. The levirate in particular – the tradition where a widow marries her dead husband's brother – at times represented a 'formality' and at others, an additional social stressor:

> My husband died 15 years ago and his younger brother married me. I had a son with this man. Since then he has remarried and he has abandoned me completely. He gives me no food and doesn't take care of me. I worry a lot about this. Our son is in school now and I cannot satisfy his needs. I often have to go home to my parents to ask them for food. (38, polygynous)

With respect to polygyny, some women suspected their co-wives of deliberately influencing their common husband to withhold care. Favouritism on the part of husbands extended to differential treatment of wives during illnesses. While under Islamic and local custom men are to marry only as many wives as they can treat equally, to a maximum of four, in practice they experienced emotional favouritism that at times was aligned with economic favouritism as well:

> My child has been sick since its birth. Its stomach and feet are swollen. You see its ribs. It can't walk. I am my husband's second wife. He doesn't take care of me, only of the first wife. I've had thirteen child deaths, three living children. I'm often sick. (42, polygynous)

A friend, who was visiting, corroborated:

> It is her aunt who gave her necessary clothing. Her husband prefers his first wife and gives the second one nothing, so last year when she had an ulcer, it was the village elected female representative, Djeneba, who took care of her, brought her food in secret. It's the husband's fault that the wives don't get along because the first one dominates him.

This favouritism was sometimes interpreted as being aligned with productive, sexual and reproductive value:

I have been blind for several years. I surrender myself to God in those matters. I have a co-wife but I do not get along with her. My husband prefers her to me because I am sickly (blind). Before my illness everything was OK between us but since I got sick he has lost interest in me and does not care for me anymore. He has not treated me; he says that he has money, but that I cannot be treated with his money.... My daughter, who is 12, is my only support. I am very sad now. (34, polygynous)

Similarly:

My co-wife has the same illness as me, *koko* and *bobodima*. It started 2 years ago. I don't know how I got it, or how people usually catch it. For my last delivery I had a lot of problems with my illness, it was very difficult at the maternity ward. People told me that it was because of the illness that made it more painful than others. It was my first time at the maternity ward but I had to go because my prior birth was so hard. My husband and his second wife have it, but I don't think that his third wife has it, because she was just recently married, just a year ago. My husband's second wife's illness started before the third co-wife came along. I talk about the illness with my husband but not with my co-wife. [Why not?] No reason. When the illness gets bad, I don't like to sit down. I cannot continue sexual relations with my husband, either. It hurts me too much, especially when the illness worsens. I can't go to the health centre because I don't have the money. *Wari ko* [I have no money]. I don't have any friends around here, either. My husband told his second wife about my illness and pays for her medications at the health centre, whereas I have been menopaused, so I am left to find traditional remedies on my own budget. (42, polygynous)

Social support during illness

The major sources of social support received during illness varied by type of support provided, and are outlined in Fig. 1. During illness, women cited their husband as their primary confidante (over 60%) and source of advice (40–50%); but other kin (daughters, natal kin, agnatic kin) were the individuals who provided the most attention, visits and affection (20–40%). In at least 20% of cases, women received no assistance for their duties during illness events (domestic work, childcare and work in the fields); for each of these categories, monogamous women were more likely to report receiving no help than polygynous women. Assistance was mostly provided by agnatic kin, daughters and co-wives (other).

Polygynous women cited their 'co-wife' as a source of social support in the following instances: as providing attention (9.6%) in helping with domestic tasks (24.4%), childcare (32.8%) and in the field (12.5%). Thus for the majority of illness episodes, co-wives were not reported as providing any form of help.

When asked about friendships, monogamous women were more likely to report having friends, controlling for age and household wealth quartile, compared with polygynous senior wives (Table 3). There was no statistical difference between polygynous senior and junior wives. While only the difference between the second and lowest wealth quartile was statistically significant, the odds ratios of three wealth quartiles all indicate that, compared with the lowest quartile and controlling for age and marital status, wealthier women are more likely to have a friend. In an auxiliary analysis combining all polygynous women together, and controlling for age and household wealth, polygynous women had 63% decreased odds of having a friend.

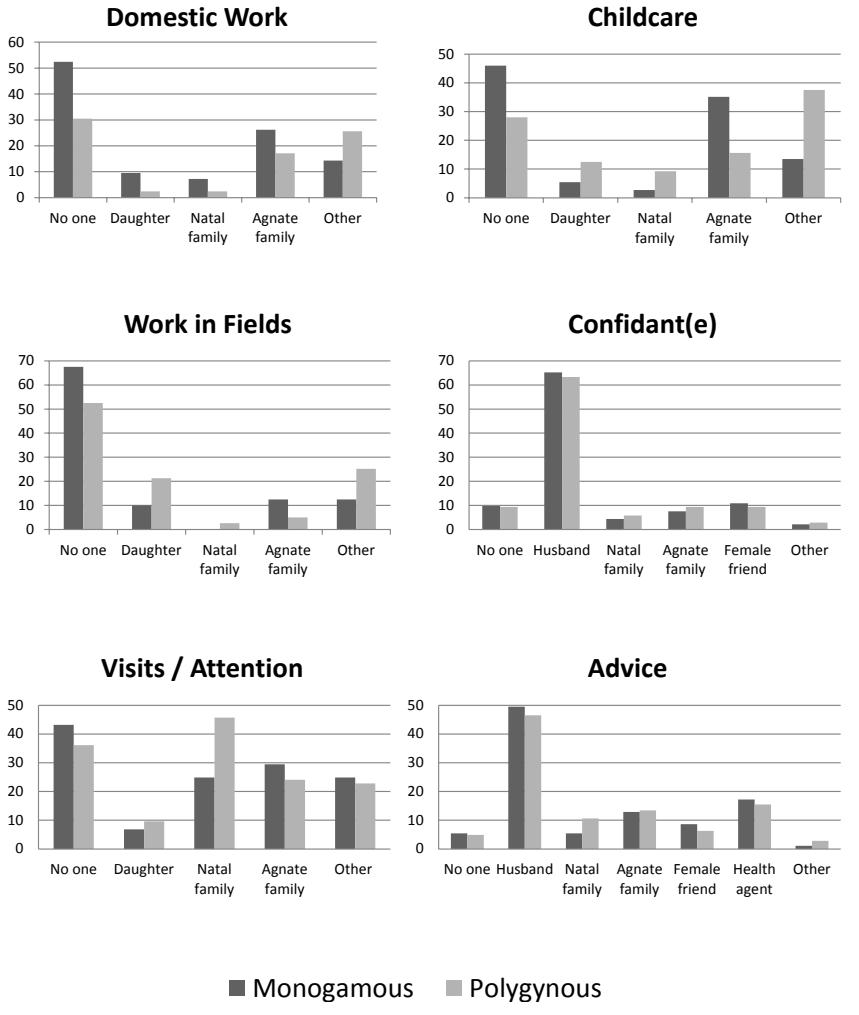

Fig. 1. Breakdown of support provided during illness to monogamous ($N = 42$) and polygynous ($N = 83$) respondents in six main areas: domestic work, childcare, work in fields, serving as confidant(e), visiting/bestowing attention and providing advice.

Support from co-wives. In general, women expressed a preference for monogamy and a cautious gratitude when they were 'alone with my husband'. However this was at times mainly because the husband, due to economic or medical hardship, could not afford another wife. With advancing age, some women did want their husband to bring in a second wife to provide assistance with conjugal duties. Women reported a broad range of support received from co-wives during illness. Their relationships ranged from harmonious to conflictive and harmful, as can be glimpsed in the section on witchcraft accusations.

Factors cited by women to increase harmony with their co-wives included successful childbearing, opportunities for shared domestic and childrearing tasks and equal treatment by husbands, and respect for marital rank. In fact, equality is formalized between co-wives in a rotation system whereby co-wives take turns cooking dinner for their husband and sleeping alongside him. In the best of circumstances, women cited a sister-like harmony with their co-wives, symbolized by communal market days or gardening, shared childrearing and shared clothing. In fact, relationships between senior and junior co-wives are highly codified in Malian society, with senior wives exchanging some loss of husband's romantic and sexual attentions in exchange for the opportunity to 'rest', to be treated with seniority, to oversee household affairs:

> We are two with the old man. The second wife is like my daughter, I have children older than her. But she treats me with respect. I do not cook any more. My daughters-in-law have entered the action so now I am *au repos* [at rest]. (55, polygynous)

Women whose relationships with their co-wives were harmonious listed them as an important source of support during illness. This support extended beyond the duration of the marriage, as widowed co-wives sometimes continued to care for one another and their families:

> I am the second wife. I get along very well with my co-wife. She only has one daughter.... She watches over me when I am sick and we do our work together and chat together. I have had nausea and upset stomach for a month and she has taken over all of my work and childcare responsibilities, brought me thoughtful things and given me advice. (27, polygynous)

It bears noting that in this case, as in the next, the supportive co-wife had accepted her own low fertility and relatively low social power. Similarly:

> I have a co-wife. She lost all her children, so my son has taken care of both of us. I get along very well with her. Recently I fell in the rain and broke my hand and my foot. Since then I am in pain and I cannot do anything. Plus, my son has lost his wife. So it is my co-wife who takes care of all of us. I am very thankful to her. The whole village and the neighbouring ones as well look to us a model of co-wifery. (60, polygynous)

In return, some women benefited from the support of a co-wife's son during illness or in times of financial need.

> These days my co-wife's son takes care of me. I helped to raise him. My own son is sickly and older. I have another son in the Ivory Coast. Other than the breast nothing ties me more to my own son than to my co-wife's son. (55, polygynous)

Conversely, factors that increased conflict between co-wives and minimized support provided during illness included asymmetric childbearing, as well as asymmetric husband attentions and investments. Conflict was manifested not only in accusations of wrongdoing and witchcraft, but also in accusations of biasing of husbands' attentions (reviewed above).

Altogether then, the extent to which women experienced support from co-wives seemed to depend on the extent to which the potential for competition – productive, reproductive and emotional – had been mitigated either through a husband's fairness, the respect for the rotation system formalizing women's conjugal duties (Clignet, 1970),

or the acceptance of a natural hierarchy between the women (either formal marital rank or informal, e.g. only one wife able to reproduce or bear sons).

Support from friends. Only a few women described having a close friend:

> I have a friend, we met when I first moved into the village. We buy clothing together and do the field work together. (22, monogamous)

Many, especially young women, reported being 'afraid of friendships with other women', fearing betrayal or indiscretion. Instead, they confided mainly in their husbands, or not at all:

> Some women do not talk about their pain. (41, monogamous)

> When I go home further into the bush, then I talk to the other women in my village. But it is difficult to have friends here. If you tell your friend secrets, some don't know how to keep secrets and then she will go tell others. That is why I don't have friends here. (27, monogamous)

Support from children. Women's daughters and daughters-in-law assisted with work in the household and fields. Materially, while a daughter might reduce a woman's workload on the day of her rotation of household duties, it is women's co-wives, sisters-in-law and daughters-in-law who take on the additional days of rotation of cooking, domestic or agricultural work, and the conjugal duties in a codified social arrangement. Pointing to a gendered division of labour, sons provided an important source of financial and emotional support:

> My sons built straw houses and then everyone moved in properly. (62, monogamous)

Women without sons reported that life was difficult, one elderly widow stating, 'I must fend for myself. I prefer death to life.' Additionally, some women reported learning about health and sanitary practices from their school-aged children:

> Now there are only two girls left, the other children all died. They are both married, one in Bamako and the other in France. The one in France sends me money but when it arrives my husband eats half and gives the other half because the daughter is not only mine. The one who is in Bamako sends me back clothes. When these arrive I am so happy that I dance and I cannot eat all day I am so happy. I don't know why I lost so many children. (47, monogamous)

Support from natal kin. Despite a tradition of virilocality, women relied on their natal kin during illness, particularly in the absence of a husband. For half of our informants, widows returned to live with their natal kin, especially if they had no sons. Additionally, relatives living in proximity visited during illness, bringing food (rice porridge, meat, fish), or medications:

> When I started to get sick, I hadn't yet had children with my husband. When I left for the hospital he was already dead.... So there was no reason for me to stay in my conjugal family. I came home of my own accord, because I know that to remain in the husband's household when you have no children [sons], and I am not young, would be to go towards a certain death. So I had to rejoin my natal family. At least my relatives will watch over me, they will never let me die of hunger or thirst. (45, widowed)

Discussion

In this study of 298 women living in the Kolondiéba *cercle* in rural Mali, the relationships between polygyny and women's reported illness susceptibility and therapeutic trajectories were complex. While this analysis of these relationships was limited in quantitative analyses, a qualitative approach revealed a richer, more nuanced view, that ranged from supportive co-operation between co-wives and company during illness, to an unease arising from accusations, whether actual or imagined, of jealousy, wrongdoing and witchcraft; difficulty coping with asymmetric investments from husbands and from imbalances in fertility; and a premature 'social menopause' in some cases.

Controlling for their increased age and household index, senior wives were less likely to be escorted to a healer by their husbands than were junior polygynous wives or monogamous wives; interestingly, the likelihood of a husband escorting a wife increased with household index. This finding may have reflected both the type of healer sought, as well as a weaker emotional bond between husbands and senior wives. Additionally, polygynous women were less likely to pay a fee for a healer's services than were monogamous women, perhaps reflecting the type of healer sought, either due to healer cost, to husband financial support available for the healer's fees or to personal preference or familiarity.

The association noted here between polygyny and marital escort to healers is analogous to a report of more infrequent husband escorts to birth delivery among polygynous women in urban Mali (Bove *et al*., 2012) and to prior reports of aloofness in the literature. Interpersonal features of husbands and wives in polygynous marriages include aloofness and looser emotional ties (Draper, 1989; Orubuloye *et al*., 1997), lack of communication about sexual health matters (Marcoux, 1997; Orubuloye *et al*., 1997; Blanc & Gage, 2000); more frequent extramarital sexual activity among polygynous men (Gage & Meekers, 1994; Blanc & Gage, 2000; Lawoyin & Larsen, 2002; Mitsunaga *et al*., 2005); higher frequent rates of interpersonal violence; and frequent rates of divorce and remarriage (Gage-Brandon, 1992; Locoh & Thiriat, 1995). The fact that senior and junior wives differed in polygynous households, after controlling for age, suggests that husbands may have displayed favouritism towards junior wives. Qualitative analyses also described favouritism exhibited by husbands surrounding their investment in women's medical treatments; this favouritism was interpreted by women as reflecting male preference for younger, healthier and more fertile wives.

Despite strong social norms governing co-wives' interactions during times when a woman cannot perform her wifely duties (illness, menstruation, postpartum taboo) (Wittrup, 1990; Madhavan, 2002), fewer than one-third of polygynous women in this quantitative analysis reported support from a co-wife during their illness for any category of support elicited. Qualitative analysis highlighted some examples of positive co-wife interactions, with support during illness received both from co-wives and even their children. There were also examples of more neutral or even antagonistic relationships. The witchcraft accusations highlighted latent hostility and aggression from co-wives, consistent with prior reports in the ethnographic literature (Dorjahn, 1988; Fainzang & Journet, 1988; Solway, 1990; Wittrup, 1990; Bledsoe, 1993; Mbassa Menick & Sylla, 1996; Strassmann, 1997). The difficulties that women in this study voiced as they coped with infertility in the face of fertile co-wives, as well as reluctance of polygynous women to adopt contraception in prior studies (Peterson, 1999; Hollos & Larsen, 2004),

suggest competition between co-wives for reproductive output and subsequent paternal investment (Olusanya, 1971; Bledsoe, 1993; Blanc & Gage, 2000; Madhavan, 2001). The examples in this study also reflect other reports of increased psychopathology in coping with infertility noted in polygynous women (Aghanwa *et al*., 1999; Donkor & Sandall, 2007).

Finally, the qualitative data suggested that polygynous women may experience a premature 'social menopause'. Senior co-wives have been found to have certain behaviours that limit fertility, such as prolonging postpartum abstinence (van de Walle & van de Walle, 1988; Borgerhoff Mulder, 1989) or lower coital frequency (Stewart *et al*., 2002). This may at times be volitional, as in the cases of older Bamanan women in Mali giving up their assigned turns with their husbands in favour of junior co-wives (Madhavan, 2002), older Gambian women adopting Western contraception to 'rest' from reproduction (Bledsoe *et al*., 1998) or senior wives enjoying relatively more power to reject their husband's advances, particularly in the presence of a junior co-wife (Lesthaeghe *et al*., 1989). However, given the reproductive competition often present between co-wives, postpartum abstinence and early 'menopause' in polygynous marriages might reflect not women's choices, but rather sexual and emotional neglect on the part of polygynous husbands (Borgerhoff Mulder, 1989). While the overall contribution of a possible 'premature menopausation' may not be significant at a population level, it could represent an emotional and, because sexual attention is linked to male investment, socioeconomic burden for a number of polygynous women. Research specifically examining sexual favouritism in polygynous households, as well as women's strategies in response to this, may provide additional insights.

The first major limitation of this study is the fact that the data were collected one decade ago. While social changes, such as increasing urbanization, migration, education, costs of living and other market forces (Solway, 1990; Antoine & Nanitelamio, 1995; Locoh & Thiriat, 1995; Marcoux, 1997; Peterson, 1999) continue, according to the 2006 DHS, 49.4% of married women aged 15–49 years in the Sikasso region were married polygynously (CPS/MS *et al*., 2007), suggesting that these findings are still applicable to a considerable section of the rural population, and that they provide an important examination of a facet social system that exists in many parts of sub-Saharan Africa. Second, the data were retrospective in nature, relying on women's recall of illness symptoms and itineraries. While this time frame was limited to the prior three months during the rainy season and the peak of illness onset to maximize yield of symptoms but minimize recall biases, these may have persisted. Third, statistical power was limited due to the small number of observations. This study was probably underpowered to significantly highlight certain aspects of the relationship between marital status and illness outcomes, which were born out in the qualitative data and showed the expected directionality in the quantitative analyses. While DHS data would provide more statistical power, they do not contain the detailed information on healthy itineraries that the study sought to analyse. This smaller cross-sectional survey provides a more in-depth analysis of the health behaviours of a rural population and ultimately points to the need for similar surveys covering more individuals.

While these qualitative data revealed several social mechanisms through which polygyny may modulate women's health, there were few statistically significant differences between monogamous and polygynous women in the quantitative data. This suggests

that some nuances of women's experiences of illness within polygynous marriages become blurred when polygyny is aggregated in quantitative studies. In fact, polygynous status often depends more on an individual's position in the life cycle (age, fertility and parity, income, employment) than on any absolute differences between polygynous and monogamous individuals (Antoine & Nanitelamio, 1995; Orobaton, 1996; Blanc & Gage, 2000). Further, quantitative data may not capture other mediating factors, such as higher rates of marital instability associated with polygyny. While the impact of age, household index and marital rank was assessed, richer and more dynamic measures of a woman's social power (e.g. marital duration, parity, influence on husband, autonomy from mother-in-law, education, opportunity for employment) and social network (e.g. number of sons and daughters-in-law, proximity to kin) could be derived. Prospective studies conducted during illness, which collected biomedical evaluations as well as documentation of resource flow (financial, in kind and emotional) and examined the impact not only of polygyny *per se* but of women's social networks and social power, might add substantially to our understanding of the ways in which polygyny modulates women's experiences during illness.

In summary, this paper drew on mixed methods to illustrate the ways in which polygyny, functioning as a model of 'co-operative conflict', mediates women's experiences of illness within their households. Specifically, polygyny was related to variable support and competition between co-wives during illness, variable investment by husbands in therapeutic itineraries, and difficulty coping with relative infertility. Further validation of these findings in larger prospective studies is an important next step towards understanding marital influences on women's health behaviours and outcomes.

Acknowledgments

The authors wish to thank the respondents who provided their time and insights for this study; researchers and staff at CERPOD (*Centre d'Etudes et de Recherche sur Population pour le Développement*), including Dr Baba Traore and Drs Rene Dala, Mouhamadou Gueye, Issa Guindo, Mamadou Kani Konate and Alpha Toure; Save the Children (USA) in Mali; the following interviewers: Amadou Konare, Adiara Kone, Koura Kone and Hawa Sissoko; and Drs Sangeetha Madhavan and Sara Castle for helpful methodological insights. Funding was provided to RB through the Fulbright Scholar Program.

References

Adams, A. & Castle, S. (1994) Gender relations and social dynamics. In Sen, G., Germaine, A. & Chen, L. (eds) *Population Policies Reconsidered: Health, Empowerment and Rights.* Harvard University Press, Harvard Center for Population and Development Studies, Cambridge, MA, pp. 151–173.

Adams, A. M., Madhavan, S. & Simon, D. (2002) Women's social networks and child survival in Mali. *Social Science & Medicine* **54**(2), 165–178.

Adams, A. M., Madhavan, S. & Simon, D. (2006) Measuring social networks cross-culturally. *Social Networks* **28**(4), 363–376.

Adeokun, L. A. & Nalwadda, R. M. (1997) Serial marriages and AIDS in Masaka District. *Health Transition Review* **7** (Supplement), 49–66.

Aghanwa, H. S., Dare, F. O. & Ogunniyi, S. O. (1999) Sociodemographic factors in mental disorders associated with infertility in Nigeria. *Journal of Psychosomatic Research* **46**(2), 117–123.

Amankwaa, A. A. (1996) Prior and proximate causes of infant survival in Ghana, with special attention to polygyny. *Journal of Biosocial Science* **28**(3), 281–295.

Amey, F. K. (2002) Polygyny and child survival in sub-Saharan Africa. *Social Biology* **49**(1–2), 74–89.

Antoine, P. & Nanitelamio, J. (1995) Peut-on Echapper a la Polygamie a Dakar? *CEPED Working Paper* No. 32. Centre Francais sur la Population et le Developpement, Paris.

Blanc, A. K. & Gage, A. (2000) Men, polygyny, and fertility over the life-course in sub-Saharan Africa. In Bledsoe, C., Lerner, S. & Guyer, J. I. (eds) *Fertility and the Male Life Cycle in the Era of Fertility Decline.* Oxford University Press, Oxford.

Bledsoe, C. (1990) Transformations in sub-Saharan African marriage and fertility. *Annals of the American Academy of Political and Social Sciences* **5120**, 115–123.

Bledsoe, C. (1993) The politics of polygyny in Mende education and child fosterage transactions. In Miller, B. D. (ed) *Sex and Gender Hierarchies.* Cambridge University Press, Cambridge, pp. 170–192.

Bledsoe, C., Banja, F. & Hill, A. G. (1998) Reproductive mishaps and western contraception: an African challenge to fertility theory. *Population and Development Review* **24**(1), 15–57.

Bongaarts, J. (1978) Framework for analyzing proximate determinants of fertility. *Population and Development Review* **4**(1), 105–132.

Borgerhoff Mulder, M. (1988) The relevance of polygyny threshold model to humans. In Mascie-Taylor, C. G. N. & Boyce, A. (eds) *Mating Patterns.* Cambridge University Press, Cambridge, pp. 209–230.

Borgerhoff Mulder, M. (1989) Menarche, menopause and reproduction in the Kipsigis of Kenya. *Journal of Biosocial Science* **21**, 179–192.

Borgerhoff Mulder, M. (1992) Women's strategies in polygynous marriage. *Human Nature* **3**, 45–70.

Bove, R. M., Vala-Haynes, E. & Valeggia, C. R. (2012) Women's health in urban Mali: social predictors and health itineraries. *Social Science & Medicine* **75**(8), 1392–1399.

Caldwell, J. C., Anarfi, J. C. & Caldwell, P. (1997) Mobility, migration, sex, STDs, and AIDS: an essay on sub-Saharan Africa with other parallels. In *Sexual Cultures and Migration in the Era of AIDS: Anthropological and Demographic Perspectives.* Clarendon Press, Oxford, pp. 41–54.

CPS/MS, DNSI & Macro (2002) *Enquete Demographique et de Sante au Mali 2001* (EDSM-2001). CPS/MS, DNSI and ORC Macro, Calverton, MD, USA.

CPS/MS, DNSI & Macro (2007) *Enquête Démographique et de Santé du Mali 2006*. CPS/MS, DNSI and ORC Macro, Calverton, MD, USA.

Creswell, J. W. (2008) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Third Edition. Sage, Los Angeles.

Dettwyler, K. A. (1992) The biocultural approach in nutritional anthropology: case studies of malnutrition in Mali. *Medical Anthropology* **15**(1), 17–39.

Donkor, E. S. & Sandall, J. (2007) The impact of perceived stigma and mediating social factors on infertility-related stress among women seeking infertility treatment in Southern Ghana. *Social Science & Medicine* **65**(8), 1683–1694.

Dorjahn, V. R. (1988) Changes in Temne polygyny. *Ethnology* **27**(4), 367–390.

Draper, P. (1989) African marriage systems – perspectives from evolutionary ecology. *Ethology and Sociobiology* **10**(1–3), 145–169.

Fainzang, S. & Journet, O. (1988) *La Femme de mon mari: étude ethnologique du marriage polygamique en Afrique et en France*. L'Harmattan, Paris.

Ferraro, G. P. (1991) Marriage and conjugal roles in Swaziland: persistence and change. *International Journal of Sociology of the Family* **21**, 89–128.

Gage, A. J. & Meekers, D. (1994) Sexual activity before marriage in sub-Saharan Africa. *Social Biology* **41**(1–2), 44–60.

Gage-Brandon, A. (1992) The polygyny–divorce relationship: a case study of Nigeria. *Journal of Marriage and the Family* **54**, 285–292.

Gibson, M. A. & Mace, R. (2007) Polygyny, reproductive success and child health in rural Ethiopia: why marry a married man? *Journal of Biosocial Science* **39**(2), 287–300.

Glaser, B. G. & Strauss, A. L. (1967) *The Discovery of Grounded Theory; Strategies for Qualitative Research*. Aldine Pub. Co., Chicago.

Gureje, O., Ogunniyi, A., Kola, L. & Abiona, T. (2011) Incidence of and risk factors for dementia in the Ibadan study of aging. *Journal of the American Geriatrics Society* **59**(5), 869–874.

Gwanfogbe, P. N., Schumm, W. R., Smith, M. & Furrow, J. L. (1997) Polygyny and marital life satisfaction: an exploratory study from rural Cameroon. *Journal of Comparative Family Studies* **28**(1), 55–71.

Gyimah, S. O. (2009) Polygynous marital structure and child survivorship in sub-Saharan Africa: some empirical evidence from Ghana. *Social Science & Medicine* **68**(2), 334–342.

Haddad, H., Hoddinott, J. & Alderman, H. (1997) Intrahousehold allocation in developing countries: models, methods and policy. Johns Hopkins University Press, Baltimore.

Hadley, C. (2005) Is polygyny a risk factor for poor growth performance among Tanzanian agropastoralists? *American Journal of Physical Anthropology* **126**(4), 471–480.

Hollos, M. & Larsen, U. (2004) Which African men promote smaller families and why? Marital relations and fertility in a Pare community in Northern Tanzania. *Social Science & Medicine* **58**(9), 1733–1749.

Ice, G. H., Heh, V., Yogo, J. & Juma, E. (2011) Caregiving, gender, and nutritional status in Nyanza Province, Kenya: grandmothers gain, grandfathers lose. *American Journal of Human Biology* **23**(4), 498–508.

Imade, G. E., Towobola, O. A., Sagay, A. S. & Otubu, J. A. (1993) Sexually transmitted diseases and medico-social factors associated with male infertility in Nigeria. *Archives of AIDS Research* **7**(3–4), 245–252.

Institut National de la Statistique (2009) *Resultats Provisoires du Recensement Général de la Population et de l'Habitat du Mali 2009* (Région de Sikasso). URL: http://instat.gov.ml/documentation/Tableaux_Demographiques_VF.pdf (accessed 10th December 2012).

Jankowiak, W., Sudakov, M. & Wilreker, B. C. (2005) Co-wife conflict and co-operation. *Ethnology* **44**(1), 81–98.

Jewkes, R., Levin, J. & Penn-Kekana, L. (2002) Risk factors for domestic violence: findings from a South African cross-sectional study. *Social Science & Medicine* **55**(9), 1603–1617.

Karamagi, C. A., Tumwine, J. K., Tylleskar, T. & Heggenhougen, K. (2006) Intimate partner violence against women in eastern Uganda: implications for HIV prevention. *BMC Public Health* **6**, 284.

Lagarde, E., Auvert, B., Carael, M., Laourou, M., Ferry, B., Akam, E. *et al.* (2001) Concurrent sexual partnerships and HIV prevalence in five urban communities of sub-Saharan Africa. *AIDS* **15**(7), 877–884.

Larsen, U. (1995) Differentials in infertility in Cameroon and Nigeria. *Population Studies* **49**(2), 329–346.

Lawoyin, T. O. & Larsen, U. (2002) Male sexual behaviour during wife's pregnancy and postpartum abstinence period in Oyo State, Nigeria. *Journal of Biosocial Science* **34**(1), 51–63.

Lesthaeghe, R. (1989) Production and reproduction in sub-Saharan Africa: an overview of organizing principles. In Lesthaeghe, R. J. (ed.) *Reproduction and Social Organization in Sub-Saharan Africa.* University of California Press, Berkeley, pp. 13–58.

Lesthaeghe, R., Kaufmann, G. & Meekers, D. (1989) The nuptiality regimes in sub-Saharan Africa. In Lesthaeghe, R. (ed.) *Reproduction and Social Organization in Sub-Saharan Africa.* University of California Press, Berkeley, pp. 238–337.

Locoh, T. & Thiriat, M. P. (1995) Divorce and remarriage in West-Africa – the Situation in Togo. *Population* **50**(1), 61–93.

McKinney Sow, B., CERPOD & Sahel Institute (1999) *L'observatoire de Population de Kolondiéba : Présentation et Perspectives.* CERPOD/INSAH, Bamako, Mali. URL: http://openlibrary.org/works/OL6234196W/L'_observatoire_de_population_de_Kolondiéba.

Madhavan, S. (2001) Female cooperation and conflict in rural Mali: effects on infant and child survival. *Journal of Comparative Family Studies* **32**(1), 75–98.

Madhavan, S. (2002) Best of friends and worst of enemies: competition and collaboration in polygyny. *Ethnology* **41**(1), 69–84.

Madhavan, S. & Adams, A. (2003) Women's networks and the social world of fertility behavior. *International Family Planning Perspectives* **29**(2), 58–68.

Marcoux, R. (1997) Nuptialite et maintien de la polygamie en milieu urbain au Mali. *Cahiers Quebecois de Demographie* **26**(2), 191–214.

Mbassa Menick, D. & Sylla, O. (1996) [Marital conflict in Senegal: an anguished plea from the women] (in French). *Medecine tropicale* **56**(4), 423–429.

Mitsunaga, T. M., Powell, A. M., Heard, N. J. & Larsen, U. M. (2005) Extramarital sex among Nigerian men: polygyny and other risk factors. *Journal of Acquired Immune Deficiieny Syndrome* **39**(4), 478–488.

Morris, M. & Kretzschmar, M. (1997) Concurrent partnerships and the spread of HIV. *AIDS* **11**(5), 641–648.

Murdock, G. P. (1967) *Ethnographic Atlas.* University of Pittsburgh Press, Pittsburgh.

Olusanya, P. O. (1971) Problem of multiple causation in population analysis, with particular reference to polygamy–fertility hypothesis. *Sociological Review* **19**(2), 165–178.

Orobaton, N. (1996) Dimensions of sexuality among Nigerian men: implications for fertility and reproductive health. In Bledsoe, C., Lerner, S. & Guyer, J. I. (eds) *Fertility and the Male Life Cycle in the Era of Fertility Decline.* Oxford University Press, Oxford, pp. 207–230.

Orubuloye, I. O., Caldwell, J. C. & Caldwell, P. (1997) Perceived male sexual needs and male sexual behavior in Southwest Nigeria. *Social Science & Medicine* **44**(8), 1195–1207.

Peron, Y. & Strohmenger, C. (1985) *Demographic and Health Indicators: Presentation and Interpretation.* Statistics Canada, Ottawa.

Peterson, S. A. (1999) Marriage structure and contraception in Niger. *Journal of Biosocial Science* **31**(1), 93–104.

Pick, W. M. & Obermeyer, C. M. (1996) Urbanisation, household composition and the reproductive health of women in a South African city. *Social Science & Medicine* **43**(10), 1431–1441.

Poulton, M. (1992) [Activity of Save the Children (USA) in the cercle de Kolondieba. The transition toward better health in Mali] (in French). *Pop Sahel: Bulletin D'information sur la Population et le Developpement* **17**, 16–20.

Selman, L. E., Higginson, I. J., Agupio, G., Dinat, N., Downing, J., Gwyther, L. *et al.* (2011) Quality of life among patients receiving palliative care in South Africa and Uganda: a multicentred study. *Health and Quality of Life Outcomes* **9**, 21.

Sen, A. (1990) Gender and cooperative conflicts. In Tinker, I. (ed) *Persistent Inequalities: Women and World Development.* Oxford University Press, New York, pp. 123–149.

Shayo, G. A. & Mugusi, F. M. (2011) Prevalence of obesity and associated risk factors among adults in Kinondoni municipal district, Dar es Salaam Tanzania. *BMC Public Health* **11**, 365.

Simon, D., Adams, A. M. & Madhavan, S. (2002) Women's social power, child nutrition and poverty in Mali. *Journal of Biosocial Science* **34**(2), 193–213.

Solway, J. S. (1990) Affines and spouses, friends and lovers – the passing of polygny in Botswana. *Journal of Anthropological Research* **46**(1), 41–66.

Stewart, H., Morison, L. & White, R. (2002) Determinants of coital frequency among married women in Central African Republic: the role of female genital cutting. *Journal of Biosocial Science* **34**(4), 525–539.

Strassmann, B. I. (1997) Polygyny as a risk factor for child mortality among the Dogon. *Current Anthropology* **38**(4), 688–695.

Traoré, B., Guèye, M., Traoré, S., Maga, I. H., Dala, R. & McKinney Sow, B. (2002) *Observatoire de Population de Kolondièba; Analyse des résultats de l'enquête de base.* CERPOD, Bamako, Mali.

Uthman, O. A., Lawoko, S. & Moradi, T. (2010) The role of individual, community and societal gender inequality in forming women's attitudes toward intimate-partner violence against women: a multilevel analysis. *World Health & Population* **12**(2), 5–17.

Van De Walle, E. (2005) African households: censuses and surveys. *General Demography of Africa Series.* M.E. Sharpe, Armonk, NY.

Van De Walle, E. & Van De Walle, F. (1988) Birthspacing and abstinence in sub-Saharan Africa. *International Family Planning Perspectives* **14**(1), 25–26.

Wittrup, I. (1990) Me and my husband's wife: an analysis of polygyny among Mandinka in the Gambia. *Folk* **32**, 117–141.