

Biomedical infertility care in sub-Saharan Africa: a social science review of current practices, experiences and view points

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Abstract

Some sort of infertility treatments, including the use of advanced reproductive technologies (ARTs), is nowadays provided at several places in sub-Saharan Africa. Yet, to date only a few studies have actually looked into the way these treatments are offered, used and experienced. In this review article the authors present and discuss empirical study findings that give insight into the way biomedical infertility care is provided, considered, experienced and/or used in sub-Saharan African countries. They concentrate on four themes that were often referred to in the reviewed studies and underline the importance of taking into account the local sociocultural context and notions when developing and implementing infertility care, namely: counselling, male involvement, acceptability of ARTs and the use of donor material (semen and embryos). In the conclusion the authors emphasize the importance of preventing infertility as part of integrated reproductive health programs and the need to improve the quality of (low tech) infertility care in the public health sector by means of standardized guidelines, training of health staff and improved counselling. In addition, from a reproductive rights perspective, they support initiatives to introduce low cost ARTs to treat tubal factor related infertility. They also point to potential unintended side effects of the introduction of ARTs and the use of donor material in the sub-Saharan African context, affecting gender inequity and inequity between citizens from different social classes, and argue that such effects should be acknowledged and avoided by all possible means. Finally, they present an agenda for future social science research on this topic in sub-Saharan Africa.

Key words: Africa - counselling - donor material - infertility - men - reproductive technologies - reproductive rights

Infertility in developing countries has long been a neglected reproductive health concern, despite the fact that it often has devastating consequences for the women and men involved. The neglect of infertility in formal health care is often explained in terms of population control (decreasing fertility growth is considered to be more important than treating infertility); the heavy burden of life-threatening conditions like HIV/AIDS and maternal mortality; and the scarcity of health resources in these countries (Inhorn and Birenbaum-Carmeli, 2008; Okanofua, 1996; Ombelet, 2009; Van Balen and Gerrits, 2001).

Since the early nineties of the former century infertility and infertility care in developing countries have slowly been receiving more attention; both in

terms of studies being carried out and in the international health arena. At the United Nations International Conference on Population and Development (ICPD) in 1994 in Cairo, prevention of infertility and appropriate treatment, where feasible, was finally accepted as a basic component of reproductive health care in its Program of Action. Subsequently, various declarations and policy documents of international organizations and meetings (World Health Assembly 2004; World Summit, 2005) have pointed to its importance (Sallam, 2008). As infertility is a condition that can lead to “marital demise, physical violence, emotional abuse, social exclusion, community exile, ineffective and iatrogenic therapies, poverty, old age insecurity, increased risk of HIV/AIDS, and death”

(Inhorn, 2009) it is suggested that reproductive rights must include the right to assist fertility when fertility is threatened, in addition to the right to control high fertility.

To date these intentions and declarations have hardly been translated into the formulation and implementation of concrete, comprehensive and systematic infertility care. Recently, the European Society of Human Reproduction and Embryology (ESHRE) has initiated a Special Task Force dedicated to improving infertility care in developing countries, as part of integrated reproductive health care programmes (Ombelet *et al.*, 2008). Comprehensive infertility care should include both prevention and treatment (low and high tech), and address issues of stigmatization, non-medical support and coping mechanisms (Gerrits *et al.*, 1999).

Until the early nineties only a few studies had looked into social and cultural aspects of infertility and childlessness in sub-Saharan Africa (Ebin, 1982; Mammo and Morgan, 1986; Sangree, 1987), which sub-continent is the focus of this article. Since then the number of studies addressing infertility and childlessness in sub-Saharan Africa has increased remarkably (for overviews see Dyer, 2008; Schuster and Hörbst, 2006; Van Balen and Bos, 2009; Van Balen and Gerrits, 2001; Van Balen and Inhorn, 2002). These studies, by providing in-depth insight into the meaning and implications of infertility and childlessness in people's daily life, have paid a significant contribution in putting infertility on the international reproductive health care agenda. These studies have also convincingly shown that the way people experience, explain and deal with infertility is strongly related with their socio-cultural and economic life circumstances and available health care options.

While some sort of infertility treatments, including the use of advanced reproductive technologies (ARTs), are currently provided at several places in sub-Saharan Africa (Giwa Osagie, 2002), to date only a few studies have actually looked into the way these treatments are offered, used and experienced. In this article we first list, based on a systematic literature review, a complete overview of studies addressing psychosocial and cultural aspects of infertility and biomedical infertility care in sub-Saharan Africa (Table 1). Subsequently, we present and discuss the study findings that give insight into the way biomedical infertility care is provided, considered, experienced and/or used in sub-Saharan African countries, both in the public health sector and the private sector. We concentrate on four themes that were often referred to in the reviewed studies and underline the importance of taking into

account the local sociocultural context and notions when developing and implementing infertility care. These four themes are: counselling, male involvement, acceptability of ARTs and the use of donor material (semen and embryos). In the conclusion we suggest an agenda for future social science research in sub-Saharan Africa, to prepare, accompany and improve initiatives intended to enhance infertility care in this region.

Methods

For this systematic review relevant peer reviewed English language publications were identified through a MEDLINE search using the keyword 'infertility' AND 'Africa'. All articles based on empirical studies addressing psychosocial and cultural aspects of infertility or infertility care in sub-Saharan countries were selected. In addition, three edited volumes containing contributions on similar topics were consulted (Inhorn and Van Balen 2002; Van Balen *et al.* 2000; Boerma and Mgalla 2001). Subsequently the bibliographies of all identified publications were searched for additional references. The publications listed in the Table are all based on original empirical research data.

Results

In total 68 publications were found addressing social and cultural aspects of infertility and/or infertility care in sub-Saharan Africa (see Table 1). Most of these studies were conducted in Nigeria, South Africa and Tanzania; other countries in which studies were done include Botswana, Cameroon, Chad, Ethiopia, the Gambia, Ghana, Kenya, Malawi, Mali, Mozambique, Rwanda and Zimbabwe.

The major part of the studies had a qualitative, anthropological study design in which data were collected through in-depth interviews, focus group discussions and/or observations. A small part of the studies included quantitative data based on (large scale) surveys (Aghanwa *et al.*, 1998; Denga, 1982; Donkor and Sandall, 2007; Dhont *et al.*, 2010; Dyer *et al.*, 2009, 2008, 2005, 2002a, 2002b; Folkvord *et al.*, 2005; Geelhoed *et al.*, 2002; Mammo and Morgan, 1986; Olatunbosum *et al.*, 1990; Onah *et al.*, 2008; Umeora *et al.*, 2008; Umezulike and Efetie, 2004).

The majority of the studies were community based; while only 18 studies were hospital based (Aghanwa *et al.*, 1998; Dhont *et al.*, 2010; Donkor and Sandall, 2007; Dyer *et al.*, 2009, 2008, 2005, 2002a, 2002b; Fatoye *et al.*, 2008; Geelhoed *et al.*, 2002; Hörbst, 2006, 2008, 2010; Mogobe, 2005; Njikam-Savage, 1992; Olatunbosum *et al.*, 2008; Sundby, 2002; Umeora *et al.*, 2008).

Table 1. — Studies addressing psychosocial and cultural aspects of infertility and biomedical infertility care in sub-Saharan Africa.

* Article only made reference to topic					
** Main theme of article					
Country	Infertility Services	ARTs	Counselling	Male Involvement	Donor Material
Botswana					
Mogobe - 2000					
Mogobe - 2005	*		*		
Upton - 2001					
Cameroon					
Feldman-Savelberg - 1994					
Feldman-Savelberg - 2002	*				
Nijkam-Savage - 1992	*	*			**
Richards - 2002					
Chad					
Leonard - 2002a	*				
Leonard - 2002b	*				
Ethiopia					
Mammo & Morgan - 1986					
The Gambia					
Sundby - 1997	**		*	*	
Sundby <i>et al.</i> - 1998	**		*	*	
Sundby & Jacobus - 2001	**	*	*	*	
Sundby - 2002	**	*	*	*	
Ghana					
Donkor & Sandall -2007	*	*			
Ebin - 1982	*				
Geelhoed <i>et al.</i> - 2002					
Yebei - 2000	*	*	*		*
Kenya					
Sangree - 1987					
Sekadde-Kigonde <i>et al.</i> - 2004	*				
Malawi					
Barden-O'Fallon - 2005a				*	
Barden-O'Fallon - 2005b					
De Kok - 2009					
De Kok & Widdicombe - 2008	*			*	
Mali					
Hadolt & Hörbst - 2009	**	**		**	*
Hörbst - 2006	*	*	**	*	*
Hörbst - 2008	*	*	*	**	*
Hörbst - 2010	*	*	*	**	*
Mozambique					
Gerrits - 1997	*			*	
Gerrits <i>et al.</i> - 1999	*			*	
Gerrits - 2002	*			*	
Mariano - 2000	*			*	
Mariano - 2004	*			*	

In Table 1 we indicate which studies addressed one or more of the themes we looked into (infertility service delivery, ARTs, counselling, male involvement and the use of donor material). We distinguish between articles in which the mentioned theme was a main study topic (**) and articles that merely referred to the theme (*).

The most comprehensive studies looking systematically into the way infertility care in sub-Saharan Africa is delivered have been conducted by Sundby and colleagues in respectively the Gambia (Sundby 1997, 2002; Sundby *et al.*, 1998; Sundby and Jacobus, 2001), Tanzania (Sundby and Larsen, 2006) and Zimbabwe (Folkvord *et al.*, 2005; Sundby and

Jacobus, 2001). Several other studies only briefly refer to the way services are delivered and/or experienced. An even more limited number of studies have looked into the provision of ARTs and the use of donor material, and/or the way people considered

these treatment options (Hadolt and Hörbst, 2009; Hörbst, 2006; Nijkam-Savage, 1992; Onah *et al.*, 2008).¹

Few studies looked broadly into male infertility (Dhont *et al.*, 2010; Dyer *et al.*, 2004, 2009; Folkvord

Table 1. — Continuation

Country	Infertility Services	ARTs	Counselling	Male Involvement	Donor Material
Nigeria					
Aghanwa <i>et al.</i> - 1998					
Cornwall - 2001					
Denga - 1982					
Fatoye <i>et al.</i> - 2008					
Hollos - 2003	*			*	
Hollos <i>et al.</i> - 2009	*				
Koster-Oyekan - 1999	*				
Okonofua <i>et al.</i> - 1997					
Olatunbosun <i>et al.</i> - 1990	*		*		
Onah - 2008		*			
Opara - 2006		**			
Orji <i>et al.</i> - 2002	*			*	
Pearce - 1999		*			**
Renne - 1996	*				*
Sangree - 1987	*	*			
Umeora <i>et al.</i> - 2008					
Umezulike & Efetie - 2004	*		*	**	
South Africa					
Dyer <i>et al.</i> - 2002a	*			*	
Dyer <i>et al.</i> - 2002b	*				
Dyer <i>et al.</i> - 2004		*	*		
Dyer <i>et al.</i> - 2005			*		
Dyer <i>et al.</i> - 2008	*				
Dyer <i>et al.</i> - 2009				**	
Rwanda					
Dhont <i>et al.</i> - 2010	**		*	**	
Tanzania					
Gijssels <i>et al.</i> - 2001	*			*	
Hollos & Larsen - 2008					
Kielman - 1998					
Mgalla & Boerma - 2001	*		*		
Pool & Wahija - 2001					
Roth-Allen - 2001					
Sundby & Larsen - 2006	**	*	*	*	
Zimbabwe					
Folkvond <i>et al.</i> - 2005	**	*	*	**	
Runganga <i>et al.</i> - 2001			*	*	
Sundby & Jacobus - 2001	**	*	*	*	*
Sundby - 2002	**	*	*	*	

et al., 2005; Hadolt and Hörbst, 2009; Hörbst, 2006, 2008, 2010; Umeora *et al.*, 2008), whereas several other studies do point to issues of male infertility and/or male involvement in infertility treatment (Dyer *et al.*, 2002a; Barden-O'Fallon, 2005a; De Kok and Widdicombe, 2008; Gerrits, 1997; Gijssels *et al.*, 2001; Hollos, 2003; Hörbst, 2006a; Mariano, 2004; Opara, 2006; Runganga *et al.*, 2001; Sundby, 1997,

2002; Sundby *et al.*, 1998; Sundby and Jacobus, 2001; Sundby and Larsen, 2006).

¹ In addition, publications were found that reflected on the meaning and use of donor material in sub-Saharan Africa (Ngwafor, 1994; Tangwa, 2002). These are not included in the Table as they are not based on empirical studies.

Biomedical infertility care

Some sort of infertility care is provided at many localities in sub-Saharan Africa, both in the public health care system and in private clinics. Yet, infertility care in the public health care system is often depicted as being 'unpredictable, uncoordinated and incomplete' (Sundby and Larsen, 2006:53),² while good quality infertility care demands extreme continuity of care and a strict coordination of the treatment process (Sundby and Larsen, 2006:48; Sundby *et al.*, 1998). Advanced reproductive technologies (ARTs) are rarely provided in the public health sector (with the exception of South Africa), but are provided in a number of private clinics (Gisa Owagie, 2002).

Public health sector

Studies that looked systematically at the provision of infertility care in the public health care system in the Gambia, Tanzania and Zimbabwe showed that the type and quality of infertility examinations and treatments offered at the various levels of health care vary considerably (Sundby and Larsen, 2006; Sundby *et al.*, 1998). Examinations for infertility at the primary level of health care in Tanzania, for example, included a clinical interview, a gynaecological exam, some screening for genital tract infection (most often not using laboratory tests) and some counselling (Sundby and Larsen, 2006). Yet, besides being incomplete according to WHO guidelines (WHO, 1993) for fertility examinations at this level (for example, sperm tests and ovulation assessments were not undertaken at all), the reported means available for examinations were not always performed nor in a systematic way. Similar haphazard and incomplete infertility examinations at this level of health care have been observed elsewhere as well (Dhont *et al.*, 2010; Gerrits, 1997; Sundby, 2002; Sundby and Jacobus, 2001).

At higher levels of health care (mainly at tertiary level) more varied and sophisticated means for diagnosis were generally available, though also at this level of care they were found to be limited and unsystematic, as compared to WHO standards (Sundby, 2002; Sundby and Jacobsen, 2001; WHO, 1993). The main referral hospital in the Gambia, for instance, offered screening for STDs (but not for Chlamydia, the STD that causes a large part of infertility problems), history taking, hystero-salpingogram, sperm tests and counselling (Sundby *et al.*, 1998). However, means to do trustworthy sperm tests were limited, due to regular delays in delivering the sperm sample (because of transport problems) and additional delays in reading the sperm samples

in the laboratory; moreover, neither laparoscopic instruments nor hormone assay tests to detect the ovulation were available.

Various other studies refer to treatment options available in the public health care sector, including for example the treatment of STDs with antibiotics, hormonal medicines to promote ovulation, surgery of fibroids or to reverse blocked tubes, and dilatation and curettage (D&C). Yet, in all reported cases treatment options are found to be incomplete, rudimentary and offered in an unsystematic and irregular way (Dhont *et al.*, 2010; Gerrits, 1997; Hollos, 2003; Leonard, 2002a; Koster-Oyekan, 1999; Sundby, 2002; Sundby and Jacobus, 2001).

In contrast to the lack of proper and standardized means for infertility diagnosis and treatment, the ample availability and overuse of D&C³ as an intervention to treat infertility in the public health sector was frequently observed (Hollos, 2003; Hollos and Larsen, 2009; Renne, 1996; Sundby, 1997, 2002; Sundby *et al.*, 1998; Sundby and Larsen, 2006). The D&C procedure is said to be irrelevant and even potentially harmful in contemporary infertility care (Sundby *et al.*, 1998). Its wide scale use in public health facilities in the Gambia is explained by the fact that doctors can charge for it, doctors often do have limited knowledge about its limited value in infertility investigation and public demand has been created because of its overuse (Sundby, 2002). People have come to see it as a way to cleanse the womb before pregnancy can take place (Renne, 1996). Doctors in a referral hospital in the Gambia were found to be aware of the irrelevance and potential harm of D&C and therefore hardly used it (Sundby, 2002).

Health workers' individual interest, knowledge and dedication appear to play an important role in infertility care in the public health sector. Overall, health workers at lower levels of the public health system had not received any systematic training in this specific area and did not know what good and systematic infertility should entail (Okonofua, 1999; Sundby, 1997; Sundby *et al.*, 1998; Sundby and Larsen, 2006). However, occasionally health workers were found to be particularly dedicated to the case of infertility and quiet knowledgeable about infertility examinations and treatments (Sundby,

² This does not per se mean that nowhere in sub-Saharan Africa systematic infertility services are provided.

³ D&C is a procedure in which the cervical opening is dilated with instruments, and the mucosal tissue from the uterus is removed by a sharp curette (Sundby, 1998).

2002).⁴ Some doctors had built up a certain fame for treating infertility, and women then regretted when they could not meet the doctor they had ‘heard’ was the best (Sundby, 1997) or complained that their treatment was suddenly interrupted due to the transfer of their doctor (Gerrits, 1997).

Referrals from one level to the other were found to be generally disorganized and back referral or feedback to lower levels hardly took place (Sundby and Larsen, 2006). Some clients only visited the clinic once, indicating that few follow-up activities were taking place, while adequate infertility care can never be delivered in a single session (Sundby *et al.*, 1998). Women (couples) with fertility problems often ‘shop around’ and combine treatments (Dhont *et al.*, 2010; Koster-Oyekan, 1999). They bypass lower levels of the health care system if they can afford to do so (Sundby and Larsen, 2006) and visit different doctors at different clinics for years without clear results or treatment (Dyer *et al.*, 2002; Sekadde-Kigindu *et al.*, 2004; Sundby, 1997), which may lead to conflicting treatments and prognosis (Hollos *et al.*, 2009) and overmedicalization (Sundby and Jacobus, 2001).

Finally, the lack of systematic record keeping has been observed at many places, which makes it impossible to assess success rates (Sundby and Larsen, 2006). For several reasons infertile women (and men) seeking help in formal health care may give up without having reached the desired result, a child of their own (Dyer *et al.*, 2002). A major concern is the financial constraint to pay for further treatment and/or to travel to the clinic, sometimes over large distances, thus forcing people to stay overnight, which adds to the costs and implies missing income for several days (Dhont *et al.*, 2010; Hörbst, 2006; Sundby, 1997; Sundby *et al.*, 1998). Further, people refer to the lack of adequate information, unclear results or diagnosis and the unsatisfactory way they are dealt with by health professionals as reasons to stop treatment (Sundby, 1997) (see also below).

Private sector: Advanced Reproductive Technologies (ARTs)

Since the 1980’s ARTs have been offered at clinics in sub-Saharan Africa, albeit at a very low scale (Feldman-Savelberg, 2002; Giwa-Osagie, 2002). The number of clinics offering ARTs has slowly increased; a complete overview of all clinics presently offering ARTs is not yet available (Giwa-Osagie, 2002).⁵ All private clinics offering ARTs are based in capital cities (and sometimes, for example in Nigeria, in other major cities as well), as both the academic specialists and the affluent clients who can

afford these treatments reside there (Gisa Owagie, 2002).

Various forms of ARTs are offered, in particular artificial insemination by husband (AIH), donor insemination (DI) and in vitro fertilization (IVF). A few countries also offer other techniques, such as intracytoplasmic sperm injection (ICSI) and embryo freezing. In a few cases the use of donor material – semen and embryos – is reported as well.⁷ Based on the limited data available Gisa Owagie (2002) deduces that the take-home baby rates resulting from IVF treatments in this region is between 5 and 15 percent; Tangwa (2002) refers to an IVF success rate of 19 percent in a Cameroon centre.

The costs of ARTs diverge considerably from place to place. For example, the costs of an IVF and related procedures (including medicines) in the reported countries vary from US\$ 1200 to US\$ 4000 (Giwa Osagie, 2002; Hadolt and Hörbst, 2009; Sundby and Jacobsen, 2001; Tangwa, 2002). In Mali the costs of a second and third IVF are lower, as couples then do not have to pay the full honorarium of the specialist (Hadolt and Hörbst, 2009). The high costs of ARTs compared to the average local income, in combination with the lack of state support and health insurances covering these expenses, make ARTs unaffordable and inaccessible for the average sub-Saharan African citizen (Donkor and Sandall, 2007; Giwa Osagie, 2002; Hadolt and Hörbst, 2009; Tangwa, 2002). The cost of one IVF treatment in Ghana is, for example, the equivalent to a nurse’s salary over one and a half year (Donkor and Sandall, 2007). It has been observed that couples were transferred from a private clinic in Zimbabwe to a public

⁴ Noticeable, at some places it was observed that expatriate doctors were outspokenly disinterested in infertility, despite the high number of women presenting with fertility problems at their clinics (Sundby, 2002; Kielman, 1998).

⁵ Giwa Osawie (2002) wrote a review on the availability of ARTs in sub-Saharan Africa, based on publications in scientific journals, conference abstracts, news media, site visits and personal enquiries from relevant health personnel in a number of sub-Saharan countries. The author excluded South Africa from his overview as “the level of scientific activity there is more akin to the developed countries than the realities in developing countries” (Ibid: 23). In addition, he states that the response he received from the various countries differed substantially in content and value, which has affected the quality of his review.

⁶ Clinics in Ghana, Nigeria and Zimbabwe offer techniques like intracytoplasmic sperm injection (ICSI), gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT), embryo freezing and/or embryo donation (Giwa Osagie, 2002). One clinic in Nigeria also practices surrogate motherhood (Ibid).

⁷ Private clinics in Harare and Banjul were found to be well equipped and staff was well qualified; yet, at the moment the study took place ARTs were not yet offered (Sundby, 2002).

hospital in South Africa, where IVF was cheaper. Hadolt and Hörbst (2009) observed that paying the equivalence of 10 to 35 Euros for a full infertility examination (including the doctor's consultation, ultrasound controls and hormonal analysis) was even considered arduous for some infertile couples in Mali.

National legislation neither ethics committees regulate the use of ARTs in sub-Saharan countries offering ARTs (Giwa Osagie, 2002; Hadolt and Hörbst, 2009; Ngwafor, 1994; Tangwa, 2002). Tangwa therefore states that "[p]roviders are thus left with only their own personal moral sensibilities and sensitivity of their consciences as the guiding lights for their action and acts within the field" (2002). Several sub-Saharan African ART centres, however, collaborate with ART centres in Europe, the USA, Australia and/or South Africa – where many of the doctors implementing ARTs also received their training – and representatives of these centres claim to voluntarily adhere to guidelines set by professional societies of these countries (Giwa Osagie, 2002; Hadolt and Hörbst, 2009).

Counselling

Counselling, both in terms of the provision of pertinent information and in terms of giving psychosocial support, constitutes an essential element of infertility care (Sundby and Larsen, 2006; WHO, 1993). It has been stated that information and counselling should be accessible for people with infertility problems, even in the absence of treatment options (Dyer *et al.*, 2004).

However, due to the lack of a standardized approach to infertility care and the training of health staff on the topic, the counselling provided, when available, is often far from complete and adequate. Infertile clients criticize the clinic staff's communication style (also in the private sector) and complain that examinations and treatment procedures, diagnosis, treatment results and prognosis are poorly explained (Hörbst, 2006; Sundby, 2002; Yebei, 2000).⁸ Infertility clients also criticized doctors for being most interested in their personal financial gain instead of informing them realistically (Hörbst, 2006).

It was only reported in one clinic in Zimbabwe that written information about infertility and infertility care was available (Folkvord *et al.*, 2005; Sundby and Jacobsen, 2001). Counselling on the menstrual cycle and the proper timing of intercourse were found to be completely lacking in some cases (Sundby, 1997, 2002); and clinic staff is not always aware of local notions of reproductive physiology or does not take these notions into account when

explaining reproductive processes (Gerrits, 1997). Further, health staff gives limited attention to the emotional distress infertility may cause, the effects it may have on sexual and marital life and the issue of male infertility (Sundby, 2002). Finally, 'reality counselling' (Sundby and Larsen, 2006) is hardly provided: neither when clients first enter the biomedical field, to avoid too early treatment seeking (Leonard, 2002a) nor at the end of the treatment trajectory, when all treatment options have been exploited (Sundby and Larsen, 2006). Women and men should get trustworthy information on what constitutes proper and improper examination methods in general (Sundby, 2002) and realistic information on their personal prognosis, to avoid endless shopping around in the biomedical field (Dhont *et al.*, 2010; Sundby and Larsen, 2006).

Counselling women and men of infertile couples jointly or separately is an issue in infertility care in sub-Saharan Africa, related with culturally embedded notions of male infertility (see below). Some infertility clinics have special clinic days and group counselling sessions only for men (Folkvord *et al.*, 2005)⁹ or invite men and women separately for the intake or when giving the outcomes of infertility examinations (Hörbst, 2006, 2008). Separate counselling sessions for men and women provide the opportunity to discuss female and male concerns discretely (avoiding embarrassment and shame) and keep examination outcomes private and secret (Hörbst, 2006, 2008). Yet, if partners of a couple are not counselled together they may not receive the same results and be unwilling to honestly share the information they received with their partner. Hörbst found that male doctors are inclined to favour the man's position: they would invite the man separately to tell him that he is the one causing the infertility problem, while they will tell the wife that both she and her husband have some problems, but that "all of this can be managed by treating them both" (2008). At other places separate counselling was observed to lead to a confusing and unproductive situation where both partners claim that "there was nothing wrong" (Gijssels *et al.*, 2001).

⁸ Ghanaian women living in the Netherlands also complained about the limited feedback they received about diagnosis and treatment (Yebei, 2000).

⁹ The consultation hour in the clinic in Harare, Zimbabwe was created as part of the project which also carried out the study (Folkvord *et al.*, 2005). Inviting men separately was also reported for Mali and South Africa by participants of the ESHRE expert meeting. (Report of expert meeting of social study group of the ESHRE Special Task Force on Developing Countries and Infertility at Genk, Belgium, December 11-12, 2009. Theme: Male infertility.)

In the context of counselling Hörbst (2006) observed that traditional relationships and patterns of communication among certain categories of people in Mali affected the communication between doctors and patients in the consultation room too. For example, “[w]hen doctors and patients were nobles (*horonw*), the gynaecological consultation was generally strained. The doctor and the patient scarcely looked at each other. Background questioning, for example, about sexual relations and marriage was done quickly... Even more tense [sic] were the gynaecological examinations...” (Ibid:44). In these cases, the professional and traditional social etiquette thus have a negative effect on patient-doctor communication; however, when doctors and patients belong to different social categories they may be allowed to talk explicitly and without embarrassment about intimate, private and emotionally charged matters, which results in better information exchange.

Male infertility and male involvement

In sub-Saharan Africa huge differences have been observed in the meaning, experiences and implications of infertility and childlessness for women and men respectively (Schuster and Hörbst, 2006; Van Balen and Bos, 2009). Traditionally, women were almost always blamed for a couple’s infertility, though exceptions exist as well (Gerrits, 1997, 2002). In contemporary African society, and when people are more confronted with biomedical notions, the awareness of male infertility seems to have increased (Dhont *et al.*, 2010; Dyer *et al.*, 2004; Hadolt and Hörbst, 2009). While women do still bear the major brunt of infertility, men too are found to suffer from stigmatization, verbal abuse, loss of social status and psycho-emotional problems due to infertility (Barden-O’Fallen, 2005a; Dyer *et al.*, 2004, 2009; Folkvord *et al.*, 2005; Hörbst, 2008; Mgalla and Boerma, 2001; Runganga *et al.*, 2001). Male infertility is generally conflated with sexual impotency and lack of virility, which adds to the burden of infertility as perceived by men (Runganga *et al.*, 2001; Hörbst, 2008). A quantitative study on the psychological impact of infertility on men, conducted in South Africa, showed significant elevated mean levels of distress in infertile men compared to fertile men (Dyer *et al.*, 2009).

Local notions of (male) infertility, kinship and gender relations affect the help seeking behaviour of infertile couples. Often, women do visit the clinic on their own, without their husband accompanying them (De Kok-Widdicombe, 2008; Dhont *et al.*, 2010; Opara, 2006; Sundby, 1997, 2002; Sundby and Jacobsen, 2001; Sundby and Larsen, 2006; Umeora *et al.*, 2008). Polygamous men were found not to be

willing to accompany their wife to the clinic, nor to pay for their wife’s treatment (Hollos, 2003); they rather tried to impregnate one of their other wives (Gijssels *et al.*, 2001; Hörbst, 2006; Nijkam Savage, 1992; Sundby, 1997; Sundby and Jacobus, 2001). Other men, who work as migrants abroad, are often not at home, and thus not available to visit the clinic for examinations and treatments (Mariano, 2004). In other cases men do not come along because they do not yet feel responsible for their wife: their marriage will only be ‘confirmed’ when the woman is pregnant and delivers a child (Runganga *et al.*, 2001; Umeora *et al.*, 2008). It has also been observed that clinic staff does not always request men to join their wives at the clinic (Sundby and Jacobus, 2001; Sundby and Larsen, 2006).

Even when men do visit the clinic, they are not always willing to fully participate in examinations and treatment (Hadolt and Hörbst, 2009). In particular, men were found to be reluctant to hand in their semen for examination. Sometimes they refuse to do so, claiming that they had already proven their fertility, as other women got pregnant from them (Hollos and Larsen, 2008; Sundby and Jacobsen, 2001; Umeora *et al.*, 2008). Other men find it difficult to produce semen by means of masturbation, either because they find the act of masturbation embarrassing or because they consider this to be against their culture (Dyer *et al.*, 2004; Sundby and Jacobsen, 2001; Umeora *et al.*, 2008). Fear that their semen might be exposed to witchcraft, was also mentioned as a reason not to hand in semen (Umeora *et al.*, 2008).

Men also resist infertility examinations out of fear of being diagnosed as the cause of the couple’s infertility problem (Hörbst, 2006; Mariano, 2004; Umeora *et al.*, 2008). For that reason they are sometimes found to hand in semen of a relative instead of their own, in order to avoid getting bad semen test results.¹⁰ Via biomedical diagnostics “men run a higher risk for public disgrace and shame, which includes double demasculinisation, concerning sexuality and authority over women” (Hörbst, 2010). Some infertile couples – when the man is diagnosed to cause the infertility – therefore hide the diagnosis from their relatives and the community, as women say they are better prepared to bear the burden of shame and stigmatization than their husbands (Hadolt and Hörbst, 2009) or they consider it as a means to “restore the equilibrium in the couple” (Mariano, 2004). In the latter case women then

¹⁰ See: Report of expert meeting of social study group of the ESHRE Special Task Force on Developing Countries and Infertility at Genk, Belgium, December 11-12, 2009. Theme: Male infertility.

rather secretly – albeit with knowledge of their husbands – find another man with whom they attempt to conceive (Mariano, 2004). This secrecy would no longer be attainable when the men’s infertility would be publicly known. Next to the partial participation of men in infertility examinations, they also are not always inclined to fully participate in infertility treatments (see below).

ARTs: acceptability

Advanced reproductive technologies are known to be deeply culturally embedded. Therefore, their acceptance and use by both professionals and (potential) users also depends on – besides on their availability and costs – whether they are “perceived as reasonable in the context of existing social relations, cultural norms, and knowledge systems” (Inhorn and Birenbaum-Carmeli, 2008). To date hardly anything is known about how professionals and (potential) users in sub-Saharan Africa perceive ARTs and their use. The scarce empirical evidence suggests that the use of ARTs in itself – that is, the fact that reproduction is assisted by third persons and partly takes place outside the body – does not raise major (ethical) concerns, as long as couples’ own ova, embryos and semen are used (Hörbst, 2006; Hadolt and Hörbst, 2009; Folkvond *et al.*, 2005).

Hörbst (2006) explains people’s acceptance of ARTs in Mali on the one hand as resulting from the woman’s desperateness and the limited information people have about clinical procedures; on the other hand the acceptance is related with some specific cultural notions about fertility. First, because female infertility is locally perceived as “something to be produced, shaped and influenced during a process from early childhood until marriage” (Ibid:42). Female fertility has thus always been assisted, for example by female excision, to achieve its full strength resulting in the birth of children. Second, the involvement of third parties (both human and non-human actors such as ghosts and spirits) and “specific objects charged with power” (Ibid) is considered normal when people seek treatment for infertility in the traditional domain. For all these reasons, Hörbst argues, medical technical procreation itself does not raise major concerns in the Malian context.

This in principle acceptance, though, does not mean that people per se prefer the use of ARTs above other means of solving infertility or childlessness. Some authors have pointed to objections of African citizens to the use of ARTs, as this would be against African values (Feldman-Savelberg, 2002; Ngwafor, 1994; Tangwa, 2002). Ngwafor (1994) contends that the “average Cameroonian” would find it strange

that so much money is invested in artificially assisted infertility, as local solutions – such as the man taking a second or third wife, secret arrangements for the woman to conceive from another man, or fostering the child of a relative – are thought to be more culturally appropriate.

In Mali the preference for local (non-medical) versus modern (the use of ARTs) solutions was found to be highly gendered: when the wives were diagnosed to cause the infertility, their husbands preferred to marry another wife to solve their problem; only when the men themselves were diagnosed to cause the infertility, were they more willing to pay for ART treatment (Hadolt and Hörbst, 2009). A Malian gynaecologist offering IVF in a private clinic therefore intended to introduce ICSI (intracytoplasmic sperm injection) as soon as possible: as ICSI is a treatment specifically for severe male infertility she assumed that men would be keen to undergo this treatment and be most willing to pay for it.

Use of donor material

ARTs thus are not always the first preference of people (men) suffering from infertility in sub-Saharan Africa. However, more outspoken doubts and disapproval are expressed when the use of donor material is implied, as in the case of DI or IVF with donor material (Giwa Osagie, 2002; Hadolt and Hörbst, 2009; Ngwafor, 1994; Nijkam-Savage, 1992; Onah *et al.*, 2008; Tangwa, 2002). The few empirical studies addressing this topic, respectively among fertile and infertile respondents in Cameroon (Nijkam-Savage, 1992) and Mali (Hörbst, 2006; Hadolt and Hörbst, 2009) and among medical students in Nigeria (Onah *et al.*, 2008), show that people’s dispositions regarding DI may differ a great deal between, but also within, the studied populations.

In general, women were more likely to approve of the use of donor material (semen) than men, which reflects the fact that women in these societies suffer more from infertility than their partners and are thus more keen to find a solution (Hadolt and Hörbst, 2009; Hörbst, 2006; Nijkam-Savage, 1992; Onah *et al.*, 2008). In addition, these diverging dispositions of women and men towards the use of donor material underline their different procreational interests (Hadolt and Hörbst, 2009). The women of infertile couples in Mali found both IUI (intra uterine insemination) or IVF with donor semen and IVF with ova donation acceptable, even when the latter treatment would not provide them with a genetically own child. These women, however, found it extremely important that the pregnancy would take place in their body, as this would give them the ex-

perience of the pregnancy, and – more important – their pregnancy would be publicly visible, which would put an end to their stigmatization as infertile women. Contrarily, the Malian infertile men were not in favour of IUI or IVF with donor semen, as this would not lead to a child that was genetically related to them. Thus, the men argued, they could as well go for the traditional solution of fostering their brother's child, as this would at least guarantee the continuation of patrilineal descent, which was their major interest (and it would be cheaper).

Differences between infertile and fertile respondents were also observed. Infertile couples (in Cameroon) were more likely to approve 'in principle' of the use of donor semen than the fertile respondents (Nijkam-Savage, 1992). Yet, when fertile and infertile respondents were asked whether they would use it themselves if they would need it (in case they would not be able to conceive with their partner by other means), many more fertile respondents agreed to practice DI compared to infertile respondents. The author suggests that the difference in responses of the two groups is due to the fact that "since the procreative ability of the first group was already confirmed, they did not really ponder seriously on the medical, moral, legal and socio-cultural implications posed by artificial donor insemination unlike the [in]fertile [sic] group and were thus more ready to accept the procedure" (Ibid:910). Contrarily, only a small minority of male and female medicine students (thus also constituting not infertile patients) in Nigeria responded to a similar hypothetical question to be in favour of the use of donor semen (Onah *et al.*, 2008).

Reasons to reject the use of donor semen reflect the prevailing cultural notions on (male) infertility and the importance of patrilineal descent. Most study respondents indicate to prefer solving infertility by polygamous relationships, traditional treatments, fostering and adoption (Hadolt and Hörbst, 2009; Nijkam-Savage, 1992; Onah *et al.*, 2008). In addition, the use of donor semen raised concerns because it was equated with adultery, because the anonymity of paternity was questioned or because it was found morally or religiously incorrect (Hörbst, 2008; Nijkam-Savage, 1992; Onah *et al.*, 2008).

Noteworthy, the highly educated group of Nigerian medical students expressed less concerns with the continuation of the patrilineal kinship lines compared to participants in the other studies, which in average were less highly educated (Hadolt and Hörbst, 2009; Nijkamp-Savage, 1992; Onah *et al.*, 2008); and the Nigerian students – being Christians – also did not refer to polygamy as a potential or preferred solution for infertility (Onah *et al.*, 2008). A major part of the female students said they were

reluctant to receive donor semen out of fear of psychological and emotional effects of educating a child that would not be their husband's; and some of them were afraid of contracting HIV through donor semen.

Finally, the study of Onah and colleagues (2008) is unique in providing insight into men's willingness to donate their semen: the small group of students that said to be willing claimed to do so for altruistic reasons and part of them also expected to receive money for it. Reasons not to be willing to donate semen included – besides the more principle objections against use of donor semen mentioned above – concerns about possible effects on their own future fertility and being screened for STDs. Finally, almost all students (male and female) were only willing to donate or accept donor sperm if their identities would not be disclosed (Onah *et al.*, 2008).

Conclusions

In this review we addressed issues of availability, quality, accessibility and acceptability of biomedical infertility care, including ARTs and use of donor material, in sub-Saharan Africa, as reported in empirical studies. The review shows that in this area only a limited number of empirical studies, specifically focus on clinical practices or people's experiences with and view points about infertility care and related issues, have been done; and no studies at all have been found that systematically and quantitatively measured patients' experiences and needs.

Good quality (basic) infertility care, offered in a systematic and standardized way, has not been reported and seems not to be provided in the public health sector; ARTs are only available in private clinics at high costs and thus only accessible for a limited number of African citizens. Yet, as suggested by some authors, major improvements in basic infertility care could be achieved relatively easy and at low cost by standardizing examinations and treatment procedures, training health staff and improving counselling practices at all levels of health care (Dhont *et al.*, 2010; Sundby and Larsen, 2006). Even with the absence of any form of biomedical treatment, basic examinations and counselling should be offered to infertile couples, to avoid uncoordinated and unproductive help seeking in the formal health care system, unrealistic hopes and the waist of personal and public money (Dhont *et al.*, 2010; Dyer *et al.*, 2004). Standard guidelines and in-service training exist for counselling and service delivery in other reproductive health areas (e.g. to provide contraceptives, reduce maternal mortality and prevent and treat HIV/AIDS), and basic services in these areas are often delivered free of charge (Sundby and

Larsen, 2006). The lack of such basic interventions/instruments to combat and treat infertility reflects the low priority infertility care has received so far from policy makers in sub-Saharan Africa. A first step in improving biomedical infertility care would be the development, introduction and financial support of such basic interventions.

The reviewed studies have identified where counselling practices and professional interactional skills in infertility care could be improved. Infertility clients need to receive adequate and realistic information at the start and the end of the treatment trajectory, in order to avoid overmedicalization. They should be fully informed about examination and treatment procedures, diagnosis, treatment results and their prognosis; and on the menstrual cycle and proper timing of intercourse, taking into account local cultural notions of reproductive physiology and infertility causation, where needed and relevant. In addition, psychosocial counselling to help people cope with the manifold negative effects of infertility on their personal life, conjugal and family relationships and their position in the community should be provided. As – scarcely – provided written information and or group education sessions proved to be highly valued (Folkvond *et al.*, 2005), such resources could be developed for other localities as well.

A major part of the infertility problems in sub-Saharan Africa are tubal factor related, mainly due to STDs, postpartum infections and unsafe abortions. These are thus preventable conditions and the prevention of infertility has to become an integrated component of all reproductive health programs/interventions aiming at the prevention of STDs and pelvic inflammatory diseases (PIDs). Moreover, tubal factor related infertility cannot be overcome with conventional infertility treatments (Okonofua, 2003). Therefore, from a reproductive rights perspective, initiatives to develop and introduce low cost ARTs – either in the public health domain or in the form of mixed private-public enterprises – deserve proper attention and support (Inhorn, 2009; Ombelet *et al.*, 2008). The ESHRE Task Force initiative to address Infertility Care in Developing Countries estimates/intends the price of one low cost IVF treatment to be around 360 Euro (which is the equivalent of the costs of one year of antiretroviral (ARV) treatment of HIV/AIDS). These low cost high-tech treatments will definitely enhance access to ARTs for a larger group of sub-Saharan African citizens (of middle and higher socioeconomic classes). However, even when costs of high-tech treatments can be decreased so dramatically, treatments will remain inaccessible for the major part of sub-Saharan African citizens. Not having access to

ARTs while they are available in ones own surroundings, increases inequity among citizens and may influence – worsen – the experience of being infertile, and can be considered an unintended and unwanted side-effect. Means to overcome this inequity have to be actively pursued to the extent possible; following for example the case of the Egyptian government, which has been experimenting with state subsidization of infertility care, including the provision of ARTs to also reach the infertile poor (Inhorn, 2009).

Various authors have expressed their concern about the lack of standardization, regulation and surveillance of fertility treatments and the use of ARTs in sub-Saharan African countries (Dhont *et al.*, 2010; Gerrits, 1997; Giwa Osagie, 2002; Hadolt and Hörbst, 2009; Hollos, 2003; Leonard, 2002a; Koster-Oyekan, 1999; Ngwafor, 1999a; Okonofua, 1999; Sundby, 1997, 2002; Sundby *et al.*, 1998; Sundby and Jacobus, 2001; Sundby and Larsen, 2006; Tangwa, 2002). Paying ample attention to these dimensions of infertility care would highly increase the quality of treatments, avoid the issue of decision-making on ethically sensitive issues solely being based on the consciousness of individual practising gynaecologists, and eliminate financial exploitation of infertile couples.

Male involvement in infertility care is found to be problematic and points to gender differences in reproductive goals and in acceptability of ARTs and the use of donor material. Men are often found to be unwilling to participate in infertility examinations and treatment. They may rather opt for traditional social solutions than for modern biomedical ones as the latter have the potential to blame men for the couple's infertility problem and are assessed as being less successful and more expensive. In particular they are not in favour of the use of donor semen as this would not give them a genetically own child, neither guarantee the continuation of their patrilineal descent. In cases where women would be diagnosed as causing the infertility, men may also prefer to go for a social solution (impregnating another wife) rather than paying for expensive treatments. In this context, pros and cons of separate and joint counselling of both partners of infertile couples should be carefully considered: counselling practices in the field of infertility may be in favour of the men's position and interests, and a more subtle counselling approach – balancing between potentially conflicting interests of women and men – seems to be dearly needed. Current insights into male involvement raise awareness and concerns about possible effects the introduction of ARTs in sub-Saharan African countries may have. While having the potential to overcome infertility problems, they may also increase gender inequity and have a devastating effect

on infertile women. This is a serious ethical concern that should be well considered before introducing ARTs in a new context. Yet, the findings on male involvement in biomedical infertility treatment and the acceptance of donor semen presented in this review were based on a very limited number of studies and cannot be generalized to all sub-Saharan countries.

This review aims to present new insights into various aspects of biomedical infertility care in sub-Saharan Africa. Yet, at the same time the review shows that many areas need further research. Firstly, we underline the importance of conducting ethnographic studies, both clinic and community based, as for example are conducted by Hörbst (2006, 2008) in Mali, Inhorn (1994, 2003) in Egypt, Gerrits (2008) in the Netherlands, and Kahn (2000) in Israel. Ethnographic studies can provide in-depth insights into the way infertility care is offered at specific localities and how specific cultural and socio-economic contexts – including kinship systems, gender relationships, local notions of (male) infertility, religion and the organization of health care – affect the way women and men experience, perceive and consider the use of infertility services in general and ARTs and the use of donor material in particular. Ethnographic studies should also pay attention to view points, experiences and concerns of infertility care providers at various health care levels.

Secondly, studies are needed to accompany and improve the process of introducing standardized infertility care, including low cost ARTs, in various locations. Such studies would have to look systematically at 1) the way infertility care is delivered at various levels of health care (cf. the studies conducted by Sundby and colleagues in the Gambia, Tanzania and Zimbabwe) and 2) women's and men's experiences with the way infertility services are delivered and their wishes and needs (cf. similar studies in western countries: Alper, 2002; Halman *et al.*, 1993; Hojgaard *et al.*, 2001; Malin *et al.*, 2001; Schmidt *et al.*, 2003; Smeenk *et al.*, 2003; Souter *et al.*, 1998; Sundby *et al.*, 1994). Issues that should be addressed include aspects of quality of care and patient friendliness, e.g. psychosocial counselling, the provision of information, organizational aspects (e.g. waiting time), privacy issues (waiting room, handing in semen); the way ethical/sensitive issues are defined and dealt with, including the use of donor material and inclusion and exclusion criteria for eligibility for treatment; the implications of the high presence of HIV/AIDS in selection, examination and treatment procedures; the experience of adverse outcomes, like multiple pregnancies, miscarriages, repetitive treatment failures, and the ovarian hyper stimulation syndrome (OHSS), and how these adverse events are dealt with in the clinic.

Thirdly, social science studies should also pay attention to the policy domain, looking at how policies regarding infertility are constituted, formulated, implemented (or not) at various levels of health care. Other topics for future research include the impact the introduction of ARTs has on poor infertile people who cannot afford these new treatments; the development of public and mass media discourses on infertility and infertility care over time and in particular the changes therein when ARTs are being introduced; and the role of patient organizations dealing with infertility and other support mechanisms to help people cope with infertility problems.

Time has come to properly address infertility, a reproductive concern that has long been neglected in the developing world, but so deeply felt by the women and men confronted with it. The introduction of proper and comprehensive infertility care, though, should be delivered – and monitored and studied – with care, to avoid its implementation causing more grief than relief (Ombelet *et al.*, 2008).

References

- Aghanwa HS, Dare FO, Ogunniyi SO. Sociodemographic factors in mental disorders associated with infertility in Nigeria. *J Psychosomatic Rev.* 1999;46:117-23.
- Alper M, Brindsen PR, Fischer R *et al.* Is your IVF programme good? *Hum Reprod.* 2002;17:8-10.
- Barden-O'Fallon J. Associates of self-reported fertility status and infertility treatment-seeking in a rural district of Malawi. *Hum Reprod.* 2005a;20:2229-36.
- Barden-O'Fallon J. Unmet fertility expectations and the perception of fertility problems in a Malawian village. *J Reprod Health.* 2005b;9:14-25.
- Boerma JT, Mgalla Z (eds). Women and infertility in sub-Saharan Africa: A multi-disciplinary perspective. KIT, Amsterdam, The Netherlands 2001.
- Cornwall A. Looking for a child: Coping with infertility in Ado-Odo, South-Western Nigeria. In Tremayne S (ed) *Managing reproductive life: Cross-cultural themes in fertility and sexuality.* 2001; New York:Berghahn:140-56.
- Denga DI. Childlessness and marital adjustment in northern Nigeria. *J Marriage & Family.* 1982;44:799-802.
- De Kok BC. 'Automatically you become a polygamist': 'culture' and 'norms' as resources for normalization and managing accountability in talk about responses to infertility. *Health.* 2009;13:197-217.
- De Kok BC, Widdicombe S. 'I really tried': Management of normative issues in accounts of responses to infertility. *Soc Sci & Med.* 2008;67:1083-93.
- Dhont N, Luchters S, Ombelet W *et al.* Gender differences and factors associated with treatment-seeking behaviour for infertility in Rwanda. *Hum Reprod.* 2010;25:2024-30.
- Donkor ES, Sandall J. The impact of perceived stigma and mediating social factors on infertility-related stress among women seeking infertility treatment in Southern Ghana. *Soc Sci & Med.* 2007;65:1683-94.
- Dyer SJ. Infertility-related reproductive health knowledge and help-seeking behaviour in African countries. *ESHRE Monogr.* July 1, 2008. 2008;1:29-33.
- Dyer SJ, Abrahams N, Hoffman M *et al.* Infertility in South Africa: Women's reproductive health knowledge and treatment-seeking behaviour for involuntary childlessness. *Hum Reprod.* 2002a;17:1657-62.

- Dyer SJ, Abrahams N, Hoffman M *et al.* 'Men leave me as I cannot have children': Women's experiences with involuntary childlessness. *Hum Reprod.* 2002b;17:1663-8.
- Dyer SJ, Abrahams N, Mokoena NE *et al.* Psychological distress among women suffering from couple infertility in South Africa: A qualitative assessment. *Hum Reprod.* 2005;20:1938-43.
- Dyer SJ, Abrahams N, Mokoena NE *et al.* 'You are a man because you have children': Experiences, reproductive health knowledge and treatment seeking behaviour among men suffering from couple infertility in South Africa. *Hum Reprod.* 2004;19:960-7.
- Dyer S, Mokoena N, Maritz J *et al.* Motives for parenthood among couples attending a level 3 infertility clinic in the public health sector in South Africa. *Hum Reprod.* 2008;23:352-7.
- Dyer S, Lombard C, van der Spuy Z. Psychological distress among men suffering from couple infertility in South Africa: a quantitative assessment. *Hum Reprod.* 2009;24:2821-6.
- Ebin V. Interpretations of infertility: The Aowin people of southwest Ghana; Ethnography of fertility and birth. 1982; London: Academic Press:13,147-59.
- Fatoye FO, Owolabi AT, Egunranti BA *et al.* Unfulfilled desire for pregnancy: Gender and family difference in emotional burden among a Nigerian sample. *J Obstet Gynaecol.* 2008;28:408-9.
- Feldmand-Savelsburg P. Is infertility an unrecognized public health and population problems? The view from the Cameroon grassfields. In: Inhorn MC and van Balen F (eds) *Infertility around the globe. New thinking on childlessness, gender, and reproductive technologies.* 2002; Berkeley: University of California Press:215-32.
- Feldmand-Savelsburg P. Plundering kitchens and empty wombs: Fear of infertility in the Cameroonian grassfields. *Soc Sci & Med.* 1994;39:12.
- Folkvord S, Odegaard OA, Sundby J. Male infertility in Zimbabwe. *Patient Educat and Counsel.* 2005;59:239-43.
- Geelhoed DW, Nayembil D, Asare K *et al.* Infertility in Rural Ghana. *Int J Gynaecol Obstet.* 2002;79:137-42.
- Gerrits T. Clinical encounters. Dynamics of patient-centred practices in a Dutch fertility clinic. 2008; Amsterdam, The Netherlands:University of Amsterdam (Unpublished PhD thesis).
- Gerrits T. Infertility and matrilineality: The exceptional case of the Macua. In Inhorn MC and van Balen F (eds) *Infertility around the globe. New thinking on childlessness, gender, and reproductive technologies.* 2002; Berkeley: University of California Press:233-46.
- Gerrits T. Social and cultural aspects of infertility in Mozambique. *Patient Educat and Counsel.* 1997;31:39-48.
- Gijssels M, Mgalla Z, Wambura L. "No child to send": Context and consequences of female infertility in northwest Tanzania. In Boerma JT and Mgalla Z (eds) *Women and infertility in sub-Saharan Africa: A multi-disciplinary perspective.* KIT, Amsterdam, The Netherlands 2001,203-21.
- Giwa-Osagie OF. ART in developing countries with particular reference to sub-Saharan Africa. In Vayena E, Rowe PJ, Griffin PD (eds) *Current practices and controversies in assisted reproduction.* World Health Organization, Geneva, Switzerland 2002,22-7.
- Hadolt B, Hörbst V. Problemlagen, Anwendungskontexte, Nutzungspraktiken. Assistierte reproduktionstechnologien in Mali und Österreich. In Dilger H and Hadolt B (eds) *Medizin im kontext: Krankheit und gesundheit in einer vernetzten welt.* 2009; Frankfurt am Main:Peter Lang Verlag:89-110.
- Halman LJ, Abbey A, Andrews FM. Why are couples satisfied with infertility treatment? *Fertility and Sterility.* 1993;59:1046-54.
- Hojgaard A, Ingerslev H, Dinesen J. Friendly IVF: Patient opinions. *Hum Reprod.* 2001;16:1391-6.
- Hollos M. Profiles of infertility in southern Nigeria: Women's voices from Amakiri. *African J Reprod Health.* 2003;7:46-56.
- Hollos M, Larsen U. Motherhood in sub-Saharan Africa: The social consequences of infertility in an urban population in northern Tanzania. *Culture, Health & Sexuality.* 2008;10:159-73.
- Hollos M, Larsen U, Obono O *et al.* The problem of infertility in high fertility populations: Meanings, consequences and coping mechanisms in two Nigerian communities. *Soc Sci & Med.* 2009;68:2061-8.
- Hörbst V. Infertility and in-vitro fertilization in Bamako, Mali: Women's experiences, avenues for solutions and social contexts impacting on gynecological consultations. *Curare.* 2006;29:35-46.
- Hörbst V. Male infertility in Mali: Kinship and impacts on biomedical practice in Bamako. In Brockopp J and Eich T (eds) *Muslim medical ethics: Theory and practice.* 2008; South Carolina:South Carolina University Press:118-37.
- Hörbst V. Male perspectives on infertility and assisted reproductive technologies (ART) in sub-Saharan contexts. F,V & V in Obgyn, 2010, ESHRE monograph: 22-7.
- Inhorn MC. Local babies, global science. *Gender, religion and in vitro fertilization in Egypt.* 2003;New York:Routledge.
- Inhorn MC. Quest for conception: Gender, infertility, and Egyptian medical traditions. 1994; Philadelphia:University of Pennsylvania Press.
- Inhorn MC. Rights to assisted reproductive technology: Overcoming infertility in low-resource countries. *Int J Gynaecol Obstet.* 2009;106:172-4.
- Inhorn MC, Birenbaum-Carmeli D. Assisted reproductive technologies and culture change. *Annual Review of Anthro.* 2008;37:177-96.
- Inhorn MC, Van Balen F (eds). *Infertility around the globe. New thinking on childlessness, gender, and reproductive technologies.* 2002; Berkeley: University of California Press.
- Kahn SM. Reproducing Jews: A cultural account of assisted conception in Israel. 2000; Durham, NC:Duke University Press.
- Kielmann K. Barren ground: Contesting identities of infertile women in Pemba, Tanzania. In Lock M and Kaufert PA (eds) *Pragmatic women and body politics.* 1998; Cambridge, UK:Cambridge University Press:127-61.
- Koster-Oyekan W. Infertility among Yoruba women: Perceptions on causes, treatments and consequences. *J of Reprod Health.* 1999;3:13-26.
- Leonard L. "Looking for children": the search for fertility among the Sara of southern Chad. *Med Anthro.* 2002a;21:79-112.
- Leonard L. Problematizing fertility: "Scientific" accounts and Chadian women's narratives. In Inhorn MC and van Balen F (eds) *Infertility around the globe: New thinking on childlessness, gender, and reproductive technologies.* 2002b; Berkeley:University of California Press:193-214.
- Malin M, Hemminki E, Räikkönen O *et al.* What do women want? Women's experiences of infertility treatment. *Soc Sci & Med* 2001;53:123-33.
- Mammo A, Morgan SP. Childlessness in rural Ethiopia. *Pop and Develop Rev.* 1986;12:14.
- Mariano EC. Conceptions about woman's childlessness and land's infertility in a Rhonga community in the South of Mozambique. In Van Balen F, Gerrits T and Inhorn M (eds) *Social science research on childlessness in a global perspective.* University of Amsterdam, Amsterdam, The Netherlands 2000,136-39.
- Mariano EC. Involuntary childlessness among the Shangana (Mozambique). *J Reprod and Infant Psych.* 2004;22:261-9.
- Mgalla Z, Boerma JT. The discourse of infertility in Tanzania. In Boerma JT and Mgalla Z (eds) *Women and infertility in sub-Saharan Africa: A multi-disciplinary perspective.* KIT, Amsterdam, The Netherlands 2001, 189-200.
- Mogobe DK. Denying and preserving self: Batswana women's experiences of infertility. *African J Reprod Health.* 2005;9:26-37.

- Mogobe DK. Traditional therapies for infertility in Botswana: Implications for the brokerage role of the nurse. In van Balen F, Gerrits T and Inhorn M (eds) *Social science research on childlessness in a global perspective*. University of Amsterdam, Amsterdam, The Netherlands 2000,111-7.
- Ngwafor EN. Childlessness in Cameroon: Artificially assisted fertility or the customary law solution. *Med Law*. 1994; 13:297-306.
- Njikam Savage OM. Artificial donor insemination in Yaounde: Some socio-cultural considerations. *Soc Sci & Med*. 1992; 35:907-13.
- Okonofua F. Infertility and women's reproductive health in Africa. *African J Reprod Health*. 1999;3:7-12.
- Okonofua F. New reproductive technologies and infertility treatment in Africa. *African J Reprod Health*. 2003;7:7-8.
- Okonofua FE. The case against new reproductive technologies in developing countries. *Br J Obstet Gynaecol*. 1996;103: 957-62.
- Okonofua FE, Harris D, Odebiyi A *et al*. The social meaning of infertility in south-west Nigeria. *Health Trans Rev*. 1997;7: 205-20.
- Olatunbosun OA, Lokulo-Sodipe O, Okonofua FE *et al*. Early experience with in vitro fertilization-embryo transfer and gamete intrafallopian transfer in a Nigerian hospital. *Int J Gynecol Obstet* 1990;33:159-63.
- Ombelet W. Reproductive healthcare systems should include accessible infertility diagnosis and treatment: An important challenge for resource-poor countries. *Int J Gynaecol Obstet*. 2009;106:168-71.
- Ombelet W, Cooke I, Dyer S, Serour G *et al*. Infertility and the provisions of infertility medical services in developing countries. *Hum Reprod. Update*. 2008;14:605-21.
- Onah HE, Agbata TA, Obi SN. Attitude to sperm donation among medical students in Enugu, south-eastern Nigeria. *J Obstet Gynaecol*. 2008;28:96-9.
- Opara C. The barren woman as an outsider in Igbo society of Nigeria. *Curare*. 2006;29:27-33.
- Orji EO, Kuti O, Fasubaa OB. Impact of infertility on marital life in Nigeria. *Int J Gynaecol Obstet*. 2002;79:61-2.
- Pearce TO. She will not be listened to in public: Perceptions among the Yoruba of infertility and childlessness in women. *Reprod Health Matters*. 1999;7:69-79.
- Pool R, Washija NR. Traditional healers, STDs and infertility in northwest Tanzania. In Boerma JT and Mgalla Z (eds) *Women and infertility in sub-Saharan Africa: A multi-disciplinary perspective*. KIT, Amsterdam, The Netherlands 2001, 241-55.
- Renne EP. The pregnancy that doesn't stay: The practice and perception of abortion by Ekiti Yoruba women. *Soc Sci & Med*. 1996;4:483-94.
- Richard SC. "Spoiling womb": Definitions, aetiologies and responses to infertility in North West Province, Cameroon. *African J Reprod Health*. 2002;6:84-94.
- Roth-Allen DM. Mchango, menses and the quality of eggs: Women's perceptions of fertility risks. In Boerma JT and Mgalla Z (eds) *Women and infertility in sub-Saharan Africa: A multi-disciplinary perspective*. KIT, Amsterdam, The Netherlands 2001,223-39.
- Runganga AO, Sundby J, Aggleton P. Culture, Identity and Reproductive Failure in Zimbabwe. *Sexualities*. 2001;4: 315-32.
- Sallam HN. Infertility in developing countries: funding the project. *ESHRE Monogr*, July 1, 2008. 2008;1:97-101.
- Sangree WH. The childless elderly in Tiriki, Kenya, and Irigwe, Nigeria: A comparative analysis of the relationship between beliefs about childlessness and the social status of the childless elderly. *J Cross-Cultural Gerontology*. 1987;2:23.
- Schmidt L, Holstein BE, Boivin J *et al*. High ratings of satisfaction with fertility treatment are common: Findings from the Copenhagen Multi-centre Psychosocial Infertility (COMPI) Research Programme. *Hum Reprod*. 2003;18:2638-46.
- Schuster S, Hörbst V. Introduction. In Hörbst V and Schuster S (eds) *Reproductive disruptions: African perspectives*. Thematical Issue: *Curare*. 2006;29:5-16.
- Sekadde-Kigundu C, Kimani VN *et al*. Perceptions of infertility in two communities in Kenya. *Gynecol Obstet Invest*. 2004;57:58-9.
- Smeenk MJJ, Verhaak CM, Stolwijk AM *et al*. Reasons for dropout in an in vitro fertilization/intracytoplasmic sperm injection program. *Fertility and Sterility*. 2004;81:262-8.
- Souter V, Penney G, Hopton JL *et al*. Patient satisfaction with the management of infertility. *Hum Reprod*. 1998;13: 1831-6.
- Sundby J. Infertility and health care in countries with less resources: Case studies from sub-Saharan Africa. In: Inhorn MC and van Balen F (eds) *Infertility around the globe. New thinking on childlessness, gender, and reproductive technologies*. 2002; Berkeley: University of California Press:247-59.
- Sundby J. Infertility in the Gambia: Traditional and modern health care. *Patient Educat & Counsel* 1997;31:29-37.
- Sundby J, Jacobus A. Health and traditional care in infertility: Experiences from the Gambia and Zimbabwe. In Boerma T and Mgalla Z (eds) *Women and infertility in sub-Saharan Africa*. KIT, Amsterdam, The Netherlands 2001,257-68.
- Sundby J, Larsen U. Healthcare services for infertility in sub-Saharan Africa: The case of Moshi in northern Tanzania. *Curare*. 2006;1929:47-57.
- Sundby J, Mboge R, Sonko S. Infertility in the Gambia: Frequency and health care seeking. *Soc Sci & Med*. 1998;7:891-9.
- Sundby J, Olsen A, Schei B. Quality of care for infertility patients. An evaluation of a plan for a hospital investigation. *Scandinavian J Soc Med*. 1994;22:139-44.
- Tangwa GB. ART and African sociocultural practices: World-view, belief and value systems with particular reference to francophone Africa. In Vayena E, Rowe PJ, Griffin PD (eds) *Current practices and controversies in assisted reproduction*. World Health Organization, Geneva, Switzerland 2002, 55-59.
- Umeora OIJ, Ejikeme BN, Sunday-Adeoye I *et al*. Sociocultural impediments to male doctor infertility evaluation in rural south-east Nigeria. *J Obstet Gynaecol*. 2008;28:323-6.
- Umezulike AC, Efetie ER. The psychological trauma of infertility in Nigeria. *Int J Gynaecol Obstet*. 2004;84:178-80.
- Upton RL. 'Infertility makes you invisible': Gender, health and the negotiation of fertility in northern Botswana. *J Southern African Studies*. 2001;27:349-62.
- Van Balen F, Bos HM. The social and cultural consequences of being childless in poor-resource areas. *F,V&V in ObGyn*. 2009;1:106-21.
- Van Balen F, Gerrits T. Quality of infertility care in poor-resource areas and the introduction of new reproductive technologies. *Hum Reprod*. 2001;16:215-9.
- Van Balen F, Gerrits T, Inhorn M (eds.). *Social science research on childlessness in a global perspective*. 2000; Amsterdam:Kohnstamm Institute.
- Van Balen F, Inhorn M. Introduction. In: Inhorn MC and van Balen F (eds) *Infertility around the globe. New thinking on childlessness, gender, and reproductive technologies*. 2002; Berkeley: University of California Press:3-32.
- World Health Organization. *WHO Manual for the standardized investigation, diagnosis and management of the infertile male*. 2004; Cambridge UK:Cambridge University Press.
- Yebei VN. Unmet needs, beliefs and treatment-seeking for infertility among migrant Ghanaian women in the Netherlands. *Reprod Health Matters*. 2000;8:134-41.