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UNMET NEED FOR CONTRACEPTION AMONG HIV-POSITIVE WOMEN IN LESOTHO AND IMPLICATIONS FOR MOTHER-TO-CHILD TRANSMISSION

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Summary. In Lesotho, the risk of mother-to-child-transmission (MTCT) of HIV is substantial; women of childbearing age have a high HIV prevalence rate (26·4%), low knowledge of HIV status and a total fertility rate of 3·5 births per woman. An effective means of preventing MTCT is to reduce unwanted fertility. This paper examines the unmet need for contraception to limit and space births among HIV-positive women in Lesotho aged 15–49 years, using the 2004 Lesotho Demographic and Health Survey. HIV-positive women have their need for contraception unmet in almost one-third of cases, and multivariate analysis reveals this unmet need is most likely amongst the poor and amongst those not approving of family planning. Urgent action is needed to lower the level of unmet need and reduce MTCT. A constructive strategy is to improve access to family planning for all women in Lesotho, irrespective of HIV status, and, more specifically, integrate family planning with MTCT prevention and voluntary counselling and testing services.

Introduction

Worldwide, 1800 children under the age of 15 years become infected with HIV each day, the vast majority of whom are in Africa (UNAIDS, 2006). Mother-to-child transmission (MTCT) of HIV is of particular concern in the southern African country of Lesotho, where the HIV prevalence rate among women aged 15–49 years is 26·4%, one of the highest national rates in the world, and the total fertility rate (TFR) is 3·5 births per woman (MOHSW *et al.*, 2005). It is estimated that the current under-five mortality rate in Lesotho of 123 deaths per 1000 births would only be 71 if there was no AIDS (Population Reference Bureau, 2006). HIV testing of pregnant women and the distribution of antiretroviral drugs during delivery and following birth are presently two primary approaches to prevent MTCT (PMTCT). However, efforts to decrease the level of MTCT can also focus on reducing unwanted fertility among HIV-positive women through use of contraception to limit or space births. This paper utilizes the 2004 Lesotho Demographic and Health Survey (LDHS) to analyse the

factors associated with unmet need for contraception amongst HIV-positive women, to help identify strategies to lower the extent of MTCT in Lesotho.

The risk of MTCT occurs during pregnancy, delivery and breast-feeding. During pregnancy and labour the risk of transmission is 15–30%; breast-feeding through 18 to 24 months increases the overall risk to 30–45% (De Cock *et al.*, 2000). There are a number of PMTCT services to address the risk of infants becoming HIV positive. HIV testing of pregnant women can identify women who require antiretroviral therapy and counselling. Antiretroviral therapy for the mother and child consists of one dose of the drug nevirapine to the mother at delivery and one dose to the child soon after birth. Counselling on risk reduction of transmission through breast-feeding may also reduce the risk of MTCT, but if there are no appropriate substitute feeds this method may not be feasible (Taha *et al.*, 2006). However, such forms of PMTCT are uncommon in Lesotho despite their potential benefit. Only 17·3% of HIV-positive women aged 15–49 years in Lesotho have ever been tested for HIV and learned their status according to the LDHS, of which not all would have been HIV-positive when tested (MOHSW *et al.*, 2005). Such low awareness of serostatus severely hampers the implementation of PMTCT programmes. Furthermore, only 10% of pregnant women in sub-Saharan Africa were offered PMTCT services in 2005 (Stover & Fahnestock, 2006, p. 11).

The reduction of unintended pregnancies is potentially an important PMTCT method in Lesotho, especially given that other methods are uncommon and HIV prevalence is high. A study found that small-to-moderate falls in unintended pregnancies, ranging from 5·6% to 34·8% in each of eight countries, can result in an equivalent number of prevented HIV infections as provision of nevirapine (Sweat *et al.*, 2004). Furthermore, increasing contraceptive method utilization is more cost-effective at reducing MTCT than nevirapine provision (Reynolds *et al.*, 2005, 2006). Contraceptive method use can also help HIV-positive women space births, which can help their health, as well as lower the need for other PMTCT services (Rutenberg *et al.*, 2003). Increases in contraceptive method use by HIV-positive women can occur through integration of family planning and HIV services. Analysis by Stover *et al.* (2003) in fourteen high-HIV-prevalence countries describes the effectiveness of adding family planning to PMTCT services at preventing unintended pregnancies, and child infections and deaths. However, at the time of the 2004 LDHS, Lesotho's national HIV policy did not make any mention of family planning (Strachan *et al.*, 2004). Throughout sub-Saharan Africa, the prevention of unintended pregnancies has been described as '… an undervalued and little-used strategy' for PMTCT (Reynolds & Wilcher, 2006, p. 8).

Previous literature addressing contraceptive use among HIV-positive women has focused on women aware of their HIV status. In some studies the knowledge of HIV status among infected women resulted in an increase in contraceptive method use, while other studies found a lack of persistent use beyond one year or no significant difference with HIV-negative women (Kamenga *et al.*, 1991; Allen *et al.*, 1992, 1993; Nebie *et al.*, 2001; Rutenberg & Baek, 2005). In Lesotho, only 35% of currently married women use a modern contraceptive method (Tuoane *et al.*, 2004; MOHSW *et al.*, 2005). An advantage of strengthening family planning services is that it potentially benefits all women, irrespective of HIV status, and would overcome

the constraint that a low proportion of HIV-positive women are aware of their serostatus.

A problem hampering the expansion of family planning programmes is socioeconomic differentials in contraceptive usage. In sub-Saharan Africa the contraceptive prevalence rate is over five times higher among women in the highest household wealth quintile compared with those in the lowest wealth quintile, a far larger differential than in any other region of the world (UNFPA, 2002). Cost and accessibility have been identified as barriers preventing poor, rural women from accessing family planning services in Lesotho (Tuoane *et al.*, 2004). Much of Lesotho is mountainous, with some women reporting taking six hours to reach a family planning clinic and facing high transport costs (Tuoane *et al.*, 2004). In the past, the number of nurses and family planning visits per population in Lesotho has been far lower in remote mountainous areas than in the more populous lowlands (Lucas, 1992). Other research has revealed that older, less educated women in Lesotho are the least likely to use modern contraception (Tuoane *et al.*, 2003). Although the level of HIV prevalence in Lesotho is lower among women in the poorest household wealth quintile (19·6%) than in any other quintile, the risk of MTCT among poor women will be of concern should they have a higher level of unmet need for contraception (MOHSW *et al.*, 2005).

There are other factors hampering some women from accessing family planning services in Lesotho. Services are commonly only open during working hours thus preventing employed women from accessing the services, providers lack national guidelines about provision of services, and clients report shortages of many preferred brands of pills (Tuoane *et al.*, 2004). Research in sub-Saharan Africa has found that the likelihood of contraceptive method use increases if a woman has visited a clinic with family planning services; other factors include having previously discussed contraception, being exposed to mass media about family planning and approving of family planning (Gupta *et al.,* 2003; Kayembe *et al.*, 2006; Tawiah, 1997).

Lesotho, with a population of 2·2 million, is a predominantly Christian country with the vast majority of the population being of Basotho ethnicity (MOHSW *et al.*, 2005). Compared with nearby Botswana, the Basotho have retained less of their traditional religious beliefs due to the impact of Christianity, especially Catholicism (Lucas, 1992). The strong influence of Catholics on the Lesotho Government since independence in 1966 has prevented further development of family planning policies, perhaps offsetting the decline in traditional religious beliefs (Lucas, 1992). However, fertility levels are relatively low by African standards, partly due to much out-migration by males to South Africa for employment in mining (Tuoane *et al.*, 2003).

Data and Methods

The data set utilized in this analysis is the 2004 LDHS, a nationally representative data set containing both HIV and family planning data. In total 8592 households were surveyed, consisting of 7522 women age 15–49 years. A two-stage sample design was conducted, comprising 405 clusters in the first stage and systematic selection of households in the second stage. All women residing in the household the previous night were eligible to be interviewed, with these women in every second household

eligible for HIV testing. Respondents voluntarily provided blood samples for HIV tests, following being informed of procedures, confidentiality and voluntary counselling and testing (VCT) services. Three to five drops of blood were collected from a finger on a filter paper card, and the filter paper was dried overnight and taken for laboratory testing. Of the 3758 eligible women 19% were not tested (12% refused to be tested: 22% in urban, 8% in rural). An individual's HIV data were anonymously linked to their socio-demographic data collected in other questionnaires, after information potentially identifying the individual was destroyed.

Unmet need for contraception comprises women who have an unmet need for limiting or spacing births. The unmet need variable is related to fertility preferences: broadly defined, an unmet need for limiting births refers to women who do not want a child in future and are not using a form of family planning, and an unmet need for spacing births refers to women who want a child in future but not within two years and are not using a form of family planning. A more detailed definition is available in MOHSW *et al.* (2005, p. 103).

Bivariate and multivariate analyses of unmet need for contraception of HIV-positive women are presented. For each analysis, only women with a need for contraception are included. The explanatory variables include the socioeconomic and demographic measures of place of residence, marital status, household wealth quintile, education, age and religion. Another variable measures the woman's knowledge that MTCT can occur during pregnancy, delivery and breast-feeding. Variables measuring whether family planning messages in at least one form of media (i.e. newspapers, radio and television) were accessed in the previous month, whether the respondent approves of contraception and whether they spoke to family planning staff in the past 12 months are also included in the models. The multivariate analyses are conducted using logistic regression in Stata 8·1 (StataCorp, 2003). HIV weights are applied in the regression and the standard errors are adjusted for the cluster design of the sample. The odds ratio, which is the exponential of the coefficient in the model, is also presented.

The first results presented are unmet need for contraception, as well as the desire for children in future and the desire for children within the next two years, by HIV status. The desire for children in future is measured as whether a woman would like to have a child at any time in the future. Women who have never had sex are included in the construction of variable, those who cannot get pregnant (i.e. sterilized or infecund) are not included, and those undecided are grouped with those not wanting a child to create the dichotomous variable. No variable in the LDHS measures the number of children desired in future. The desire for children within the next two years is measured similarly.

Results

Table 1 shows the desire for a child in future and unmet need for contraception by HIV status. A considerable proportion of HIV-positive women want to have a child in future (38·7%), which is lower than the figure for HIV-negative women (44·4%). In contrast, the percentage of HIV-positive women wanting a child within the next two years is higher (17·1%) than for HIV-negative women (10·8%). Unmet need for contraception is lower among HIV-positive women (31·3% of women with a need for

Table 1. Desire for a child in future and within next two years and unmet need for contraception to limit or space births by HIV status (%), women aged 15–49 years, Lesotho, 2004

	HIV-positive	HIV-negative	Total	*N*
Desire child in future	38·7	44·4	42·7*	2826
Desire child within next two years	17·1	10·8	12·4*	2826
Unmet need for contraception	31·3	44·3	40·6**	1447

Asterisks indicate result of χ^2 test of HIV-positive versus HIV-negative women.
*$p<0·05$; **$p<0·01$.
Only women with a conclusive HIV test result were included in the analyses.
Note: Weighted cases.

Table 2. Current contraceptive method (%), HIV-positive women aged 15–49 years, Lesotho, 2004

Current contraceptive method	%	*N*
Not using	64·0	510
Pill	10·9	87
IUD	0·8	6
Injections	14·3	114
Condom	6·2	49
Female sterilization	2·2	17
Other	1·7	13
Total	100·0	798

Note: Weighted cases.

contraception) than HIV-negative women (44·3%). It is worth noting that 55·0% of HIV-positive women have a need for contraception to limit or space births according to the definition used; 403 cases have a need for contraception divided by the 733 cases of HIV-positive women included in the desire for a child in future analysis. Of those women using contraception, Table 2 shows that injections (14·3%) and the pill (10·9%) are the most popular for HIV-positive women, followed by condoms (6·3%).

Table 3 presents the results from the bivariate and multivariate analyses of unmet need for contraception to limit or space births. The unmet need for contraception has a bivariate relationship with a number of variables. There is significantly greater unmet need among HIV-positive women who live in rural areas, are currently married, live in poorer households, have less education and are older. Unmet need for contraception is also higher for women who have not heard of family planning in the media, do not approve of contraception and with knowledge of MTCT. There is no

Table 3. Bivariate and multivariate analysis of unmet need for contraception to limit or space births, HIV-positive women aged 15–49 years, Lesotho, 2004

	Bivariate	Multivariate	
	% with unmet need	Odds ratio	*Z*
Place of residence	**		
Urban	19·9	Ref.	
Rural	36·8	1·404	0·37
Marital status	**		
Never married	15·5	Ref.	
Currently married	38·7	3·318*	2·33
Formerly married	17·5	0·856	− 0·23
Household wealth quintile	**		
Lowest	56·1	Ref.	
Second-lowest	32·3	0·162**	− 3·20
Middle	38·2	0·460	− 1·38
Second-highest	30·9	0·315*	− 2·08
Highest	21·8	0·223*	− 2·47
Highest education level	**		
None/primary incomplete	40·1	Ref.	
Primary complete	35·9	1·120	0·29
Secondary incomplete+	23·8	0·773	− 0·70
Age	**		
15–19 years	18·9	Ref.	
20–24 years	32·5	2·411	1·22
25–34 years	22·1	1·534	0·60
35+ years	45·2	4·951*	2·33
Religion			
Roman Catholic	35·0	Ref.	
Lesotho Evangelical	22·5	0·642	− 1·14
Other	33·7	0·888	− 0·37
Knowledge of MTCT	*		
No	21·1	Ref.	
Yes	35·9	1·677	1·51
Heard of FP in the media	*		
No	33·9	Ref.	
Yes	27·5	1·141	0·40
Spoke to FP staff			
No	32·4	Ref.	
Yes	26·3	0·672	− 0·92
Approve of contraception	**		
No	70·5	Ref.	
Yes	29·2	0·263*	− 2·95
Number of cases (unweighted)		395	

*$p<0·05$; **$p<0·01$.
For bivariate analysis, significance determined by χ^2 test.
Source: MOHSW *et al.* (2005).

significant bivariate difference in unmet need for religion and whether the woman has spoken to family planning staff.

Consistent with the bivariate findings, there is a strong multivariate relationship between household wealth quintile and unmet need for contraception amongst HIV-positive women. A HIV-positive woman in the second-highest (odds ratio=0·32) or highest (odds ratio=0·22) wealth quintile is much less likely to have an unmet need for contraception compared with a woman in the lowest quintile. A HIV-positive woman in the second-lowest quintile is also significantly less likely to have an unmet need. A currently married woman has a greater unmet need for contraception (odds ratio=3·32) than a never-married woman, while a HIV-positive woman age 35 years and above is far more likely to have an unmet need compared with a teenage woman. If a woman approves of contraception she is much less likely (odds ratio=0·26) to have an unmet need for contraception to limit or space births. Despite having a significant bivariate association with unmet need of a HIV-positive woman, place of residence, education level, knowledge of MTCT and hearing of family planning in the media do not have a significant association in the multivariate analysis.

Discussion and Conclusion

The risk for MTCT of HIV in Lesotho is substantial. The combination of a high HIV prevalence rate and low knowledge of HIV status among women of childbearing age, together with a considerable desire for childbearing and unmet need for contraception among HIV-positive women, has potentially drastic consequences for HIV infection of infants in Lesotho. One means of PMTCT with demonstrated effectiveness is to lower the number of unwanted pregnancies through reduction of unmet need for contraception among HIV-positive women. This paper has sought to identify the factors associated with unmet need for contraception among HIV-positive women to inform the strengthening of family planning programmes as a form of PMTCT.

Before discussing the extent of unmet need among HIV-positive women in Lesotho, the level of desire for children is worth noting. A considerable proportion of HIV-positive women want to have a child at any time in the future and, compared with HIV-negative women, they are more likely to want to give birth within the next two years. These findings illustrate that, according to HIV-positive women's fertility desires, there is significant potential for MTCT in future. In addition to increasing contraception levels, other forms of PMTCT such as antiretrovirals, will also be important for women who wish to give birth. Interpretation of such findings needs to consider the low proportion of HIV-positive aware of their serostatus, although analysis of the impact of such awareness on fertility desires is beyond the scope of this paper.

The analysis has revealed that most HIV-positive women in Lesotho have a need for contraception to limit or space their births. Only 6·3% of HIV-positive women use a condom, hence contraceptive method use is contributing little to the prevention of transmission of the virus to a serodiscordant partner. Promotion of family planning will help increase the level of condom use, which will have a preventive effect on HIV transmission.

Almost one-third of HIV-positive women in Lesotho with a need for contraception do not have this need met. The multivariate analysis reveals the important finding that HIV-positive women in the lowest wealth quintile are most likely to have an unmet need for contraception to limit or space births. Such a disadvantage of unmet need for the poorest women has been revealed elsewhere (UNFPA, 2002). For women in remote areas especially, wealth may be a strong predictor because of transport costs associated with reaching family planning facilities, as explained by Tuoane *et al.* (2004). Although the poorest women in Lesotho are the least likely to be HIV positive, their low use of contraception (56·1% have an unmet need) means they have a heightened risk of unplanned pregnancy and their children are at risk of becoming infected. These families may also be least likely to cope financially if the mother has AIDS, so having a HIV-positive child would place an even greater burden.

Of the other factors, the strongest relationship for HIV-positive women is for the currently married, who are at higher risk of not having their need for contraception met than never-married women. This result suggests that never-married women and their partners are particularly guarded against pregnancy because they are not in a formal union. Education and place of residence are not significant in the multivariate analysis despite having a bivariate relationship, most likely because of the strength of wealth. A HIV-positive woman's approval of contraception is found to decrease her unmet need; this finding supports that of Tawiah (1997) and indicates that a significant demand barrier to contraception exists and efforts to promote understanding of the benefits of contraception will help women who wish to limit or space births. However, learning of family planning in the media or speaking to family planning staff in the past 12 months is not related to unmet need. The lack of association with media contradicts the findings of Gupta *et al.* (2003). These findings indicate that messages outlining the benefits of family planning are not being understood by the intended recipients, and therefore steps need to be taken to improve the communication of the benefits of family planning.

The findings suggest that the improvement of family planning accessibility is essential to enable all HIV-positive women to 'make informed reproductive choices' (Reynolds & Wilcher, 2006, p. 8). Family planning programmes throughout Lesotho need to be more accessible for all women, irrespective of HIV status, given the low awareness of serostatus. Improvement in accessibility for women in remote areas is especially important, as is longer opening hours and programmes aimed at reaching women who have never used family planning services before.

A more specific strategy is integration of family planning services into HIV services to enable women who test HIV positive and wish to limit or space their births to better access contraception and reduce the level of MTCT. However, given that Lesotho's HIV policy in 2004 did not mention family planning, further steps towards such integration need to be made. The addition of family planning to PMTCT services can prevent unintended pregnancies and child infections and deaths. To increase the level of VCT, integration of this and other HIV services into family planning programmes will help increase the proportion of HIV-positive women who are aware of their status and educate them of the benefits of contraception as a means of PMTCT. As outlined by Tuoane *et al.* (2004), for many women the family

planning clinic visit is their only opportunity to obtain preventive care, so such clinics should provide HIV services. Programmatic or survey-based research would provide insight into how such integration would proceed. Potential challenges to integration identified include pregnant women having more immediate concerns, such as HIV diagnosis, than contraception in the post-partum period (Duerr *et al.*, 2005).

Such action needs urgently to be taken given the substantial risk of MTCT in Lesotho to prevent the infection of many infants and the associated burden it will place on families. Importantly, strengthening of the family planning system and its integration with PMTCT and VCT services utilizes existing service infrastructure. Such a strategy should also be appropriate for other countries with similar conditions that heighten the risk of MTCT.

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References

Allen, S., Serufilira, A., Gruber, V., Kegeles, S., van de Perre, P., Caraël, M. & Coates, T. J. (1993) Pregnancy and contraceptive use among urban Rwandan women after HIV testing and counselling. *American Journal of Public Health* **83**, 705–710.

Allen, S., Tice, J., van de Perre, P., Serufilira, A., Hudes, E., Nsengumuremyi, F. *et al.* (1992) Effect of serotesting with counselling on condom use and seroconversion among HIV discordant couples in Africa. *British Medical Journal* **304**, 1605–1609.

De Cock, K. M., Fowler, M. G., Mercier, E., De Vincenzi, I., Saba, J., Hoff, R. *et al.* (2000) Prevention of mother-to-child HIV transmission in resource-poor countries: translating research into policy and practice. *Journal of the American Medical Association* **283**, 1175–1182.

Duerr, A., Hurst, S., Kourtis, A. P., Rutenberg, N. & Jamieson, D. J. (2005) Integrating family planning and prevention of mother-to-child HIV transmission in resource-limited settings. *Lancet* **366**, 261–263.

Gupta, N., Katenda, C. & Bessinger, R. (2003) Associations of mass media exposure with family planning attitudes and practices in Uganda. *Studies in Family Planning* **34**, 19–31.

Kamenga, M., Ryder, R. W., Jingu, M., Mbuyi, N., Behets, F., Brown, C. & Heyward, W. L. (1991) Evidence of marked sexual behavior change associated with low HIV-1 seroconversion in 149 married couples with discordant HIV-1 serostatus: experience at an HIV counselling center in Zaire. *AIDS* **5**, 61–67.

Kayembe, P. K., Fatuma, A. B., Mapatano, M. A. & Mambu, T. (2006) Prevalence and determinants of the use of modern contraceptive methods in Kinshsa, Democratic Republic of Congo. *Contraception* **74**, 400–406.

Lucas, D. (1992) Fertility and family planning in Southern and Central Africa. *Studies in Family Planning* **23**, 145–158.

Ministry of Health and Social Welfare (MOHSW) [Lesotho], Bureau of Statistics (BOS) [Lesotho] & ORC Macro (2005) *Lesotho Demographic and Health Survey 2004*. MOHSW, BOS & ORC Macro, Calverton, MD.

Nebie, Y., Meda, N., Leroy, V., Mandelbrot, L., Yaro, S., Sombie, I. *et al.* (2001) Sexual and reproductive life of women informed of their HIV seropositivity: a prospective cohort study in Burkina Faso. *Journal of Acquired Immune Deficiency Syndrome* **28**, 367–372.

Population Reference Bureau (PRB) (2006) *How HIV and AIDS Affect Populations*. BRIDGE, Population Reference Bureau, Washington.

Reynolds, H. W., Janowitz, B., Homan, R. & Johnson, L. (2006) The value of contraception to prevent perinatal HIV transmission. *Sexually Transmitted Diseases* **33**, 350–356.

Reynolds, H. W., Steiner, M. J. & Cates, W. (2005) Contraception's proved potential to fight HIV. *Sexually Transmitted Infections* **81**, 184–185.

Reynolds, H. W. & Wilcher, R. (2006) Best kept secret in PMTCT: contraception to avert unintended pregnancies. *AIDSLink* **97**, 8–9.

Rutenberg, N. & Baek, C. (2005) Field experiences integrating family planning into programs to prevent mother-to-child transmission of HIV. *Studies in Family Planning* **36**, 235–245.

Rutenberg, N., Siwale, M., Kankasa, C., Mduati, R., Ngacha, D. M., Oyieke *et al.* (2003) *Family planning and PMTCT services: Examining Interrelationships, Strengthening Linkages*. Horizons Research Summary, Population Council, Washington.

StataCorp (2003) *Stata 8·1*. Stata Corp, College Station.

Stover, J. & Fahnestock, M. (2006) *Coverage of Selected Services for HIV/AIDS Prevention, Care, and Treatment in Low- and Middle-Income Countries in 2005*. Constella Futures, POLICY Project, Washington.

Stover, J., Fuchs, N., Halpern, D., Gibbons, A. & Gillespie, D. (2003) *Adding Family Planning to PMTCT Sites Increases the Benefits of PMTCT*. USAID Issues Brief, Bureau for Global Health, Washington.

Strachan, M., Kwateng-Addo, A., Hardee, K., Subramaniam, S., Judice, N. & Agarwal, K. (2004) *An Analysis of Family Planning Content in HIV/AIDS, VCT, and PMTCT Policies in 16 Countries*. Policy Working Paper Series No. 9. POLICY, Washington.

Sweat, M. D., O'Reilly, K. R., Schmid, G. P., Denison, J. & de Zoysa, I. (2004) Cost-effectiveness of nevirapine to prevent mother-to-child HIV transmission in eight African countries. *AIDS* **18**, 1661–1671.

Taha, T. E., Kumwenda, N. I., Hoover, D. R., Kafulafula, G., Fiscus, S. A., Nkhoma, C., Chen, S. & Broadhead, R. L. (2006) The impact of breastfeeding on the health of HIV-positive mothers and their children in sub-Saharan Africa. *Bulletin of the World Health Organization* **84**, 546–554.

Tawiah, E. O. (1997) Factors affecting contraceptive use in Ghana. *Journal of Biosocial Science* **29**, 141–149.

Tuoane, M., Diamond, I. & Madise, N. (2003) Use of family planning in Lesotho: the importance of quality of care and access. *African Population Studies* **18**, 105–132.

Tuoane, M., Madise, N. J. & Diamond, I. (2004) Provision of family planning services in Lesotho. *International Family Planning Perspectives* **30**, 77–86.

UNAIDS (2006) *2006 Report on the Global AIDS Epidemic*. UNAIDS, Geneva.

UNFPA (2002) *State of World Population 2002: People, Poverty and Possibilities*. UNAIDS, Geneva.