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ABSTRACT

Zimbabwe is ranked among the 40 countries in the world with high maternal mortality. HIV/AIDS is the leading indirect cause of maternal mortality in Zimbabwe, accounting for 26% of the recorded maternal deaths. HIV-positive pregnant women face increased health risks because of their status, and it is crucial that they adhere to the appropriate antenatal care (ANC) protocol and deliver under skilled care in a health facility. In this study we hypothesized that HIV-positive pregnant women are more likely to use maternal health services compared with HIV-negative pregnant women. Using secondary data from the 2010-11 Zimbabwe Demographic and Health Survey (ZDHS), we examined the association between knowledge of HIV status and use of maternal health services.

The study selected 2,362 women age 15-49 who gave birth in the three years preceding the ZDHS, were tested for HIV during ANC and received the results. Two variables were used to measure use of maternal health services: number of ANC visits and place of delivery. Knowledge of HIV status was determined using data from the survey questions that asked women if they were tested for HIV and received the test results during their last pregnancy, as well as using the actual HIV test results obtained at the time of the 2010-11 ZDHS. We performed chi-square tests and logistic regression to determine association.

The results indicate that there is no significant association between use of maternal health services and knowledge of HIV status. HIV-positive women are not different from their HIV-negative counterparts in use of maternal health services. The fact that the results do not support the study hypothesis raises serious concerns about implications for programmes designed to prevent mother-to-child transmission (PMTCT) of HIV and the overall fight to prevent maternal deaths.

INTRODUCTION

Zimbabwe, with its high maternal mortality ratio (MMR) of 960 maternal deaths per 100 000 live births, is ranked among the 40 countries in the world with high maternal mortality (WHO et al. 2012; ZIMSTAT and ICFI 2012). The leading direct causes of maternal mortality include postpartum haemorrhage, pregnancy-induced hypertension and puerperal sepsis (Munjanja et al. 2007). Recent figures from the *Annual Report for Notified Institutional Maternal Deaths: 2010-2011* (Ministry of Health and Child Welfare 2012) suggest that little has changed over the years and postpartum haemorrhage remains the leading cause of maternal mortality, accounting for 24% of maternal deaths, followed by sepsis at 21%, pregnancy-induced hypertension-eclampsia at 11% and malaria at 7%. Skilled care during pregnancy, at delivery—including emergency obstetric care to ensure access to timely treatment for women experiencing complications—and after delivery are key to reducing maternal deaths, according to *The Zimbabwe National Maternal and Neonatal Health Road Map, 2007-2015* (Government of Zimbabwe 2007), particularly for HIV-positive women (Birungi et al. 2011).

HIV/AIDS is the leading indirect cause of maternal deaths in Zimbabwe, accounting for about a quarter of the recorded maternal deaths (Munjanja et al. 2007). Other findings suggest mortality among HIV-infected pregnant or postpartum women is up to eight times higher compared with HIV-negative women (Zaba et al. 2013). Co-infection with diseases such as tuberculosis and malaria in HIV-infected women increases the fatality of common causes of maternal mortality, and any efforts to reduce maternal mortality must address HIV risk factors (CSO and Macro International 2000; Munjanja et al. 2007; Ticconi et al. 2003). Programmes for prevention of mother-to-child transmission (PMTCT) of HIV have been an integral part of the fight against both maternal and neonatal deaths in many countries including Zimbabwe.

Knowing more about the health-seeking behaviour of women is vital to reducing the number of maternal deaths. Past studies have found that delay in deciding to seek care contributes to 56% of maternal deaths (Munjanja et al. 2007). Given the increasing availability of maternal health services, health outcomes should improve for HIV-positive women. However, few studies have attempted to understand the health-seeking behaviour of pregnant HIV-positive women; to date, we know of no such study in Zimbabwe. This report attempts to explore whether women who know they are HIV-positive are more likely to use available maternal health services because of

perceived increased health risks (to themselves and their baby) than women who know they are HIV-negative.

BACKGROUND

The antenatal care clinic is a key entry point for pregnant women to receive a broad range of health promotion and preventive services. Focused antenatal care (ANC)[1] has been found to be most effective in preventing adverse pregnancy outcomes and is an essential component of the quality of care for all pregnant women (Ethiopian Society of Population Studies 2008). ANC is most effective when sought early and consistently throughout pregnancy. The 2010-11 Zimbabwe Demographic and Health Survey (ZDHS) reported that, for women who had a live birth in the five years preceding the survey, 89% had at least one ANC visit and 65% had four or more visits (ZIMSTAT and ICFI 2012). However, only 19% of the women had their first ANC visit within the first trimester. This is important because, typically, HIV tests are offered to pregnant mothers at their first ANC visit to enable identification of HIV-infected pregnant women. Women who test positive for HIV can then be given appropriate HIV care and treatment (for both the pregnant woman and the baby) to prevent mother-to-child transmission (MTCT) of HIV.

Closely linked to ANC in ensuring better pregnancy outcomes is delivery in a health facility. Proper medical attention and obstetric care from a skilled provider (doctor, nurse-midwife or nurse) during delivery is a critical element in the reduction of maternal and neonatal mortality. Sixty-five percent of live births in the five years preceding the 2010-11 ZDHS occurred in health facilities (ZIMSTAT and ICFI 2012). Results from the ZDHS show that deliveries that take place in a health facility are more likely to be attended by trained health professionals. In the case of HIV-positive pregnant women, delivering in a health facility allows the baby to receive appropriate HIV care for prevention of mother-to-child transmission (PMTCT) of HIV within the prescribed time period after birth. Delivering in a health facility also increases the likelihood of a good outcome for both mother and child.

HIV-positive pregnant women face increased health risks as a result of their status (Birungi et al. 2011; Munjanja et al. 2007; Ticconi et al. 2003; Zaba et al. 2013), so it is critical that they adhere to the ANC protocol and deliver under skilled care in a health facility. So far, only a few studies have examined the use of maternal services by HIV-positive pregnant women. Simkhada et al. (2008) and Gabrysch and Campbell (2009) reviewed several papers highlighting factors

[1] Focused antenatal care is defined as providing integrated, individualized care during pregnancy.

affecting the use of antenatal care and delivery services, and none of them explored knowledge of HIV status as a factor.

The few studies that assess the impact of knowledge of HIV status on subsequent use of health services have produced mixed results. One study conducted in rural hospitals in Lesotho suggested that women who know their HIV status prior to the first ANC visit, particularly HIV-positive pregnant women, should attend ANC earlier and more frequently than women who are unaware of their status (Tiam et al. 2012). The study found that for those women who were unaware of their HIV status prior to the first ANC visit, the number of subsequent visits attended did not differ between HIV-positive and HIV-negative women. Examining use of maternal health services by HIV-positive female adolescents in Kenya, Birungi et al. (2011) found that use of health services was generally low and that HIV-positive adolescents were less likely to use maternal health care for higher-order pregnancies than for lower-order pregnancies. However, the study did not indicate whether these results are unique to HIV-positive adolescents.

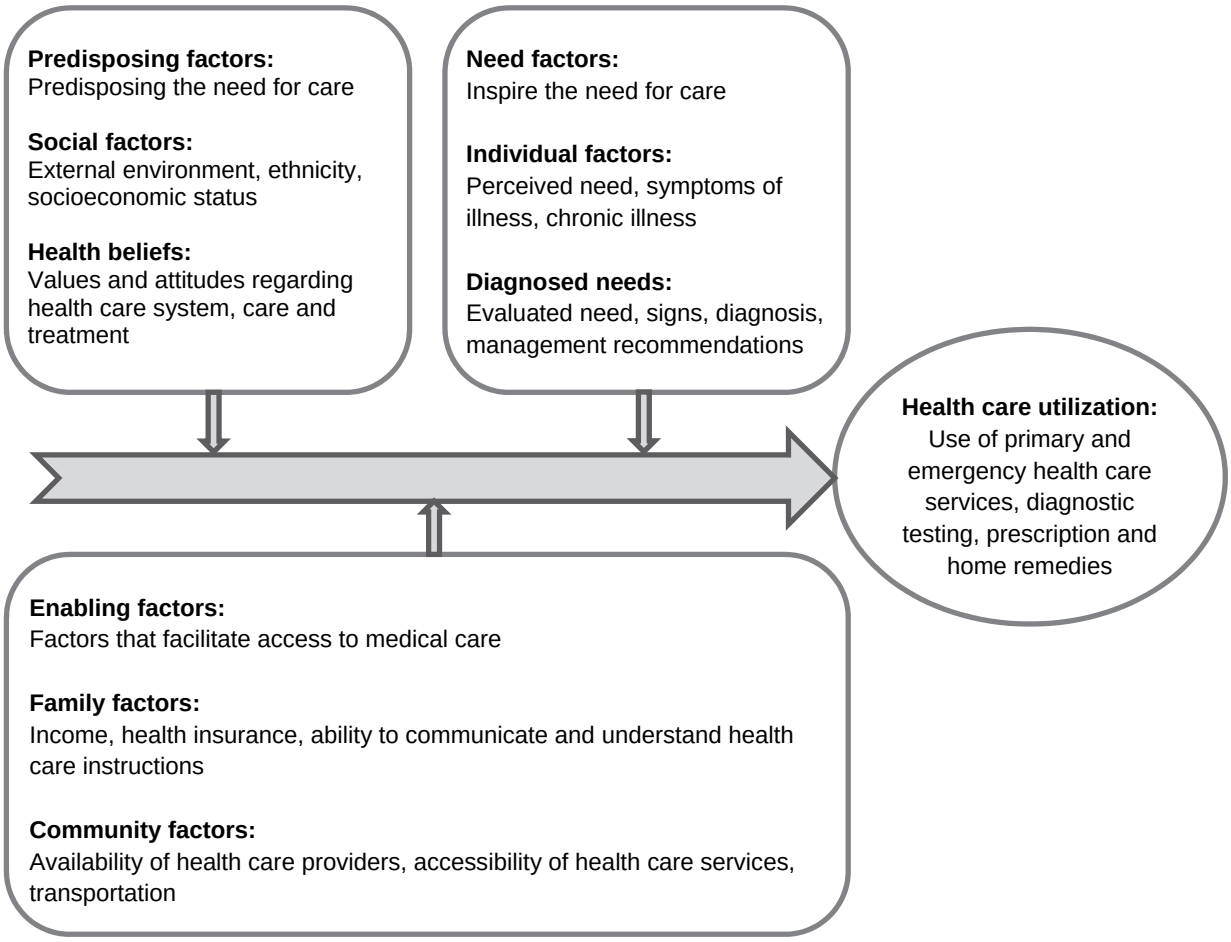
Ciampa et al. (2012) argue that studies on the relationship between HIV knowledge and related behaviour are limited because of lack of reliable and valid measures of HIV knowledge. Our use of ZDHS data for this analysis is no exception to this limitation; however, we benefitted from their suggestions in our construct of the measure of knowledge of HIV status.

Accurate knowledge of HIV/AIDS is an important, although not necessarily sufficient, factor for adoption of healthy behaviours (Bandura 2008). In this study we are guided by the Andersen's Behavioural Model of Health Care Utilization (Figure 1). The model describes factors that inhibit or facilitate access to health care, and how these factors are applied in the process of seeking and using health services (Andersen 1995; Wallace et al. 2004).

Andersen suggested that use of health care services depends on at least three sets of individual and contextual characteristics. First are *predisposing factors,* including 1) demographic factors (e.g., age, sex, marital status etc.), 2) social structural factors (e.g., education, ethnicity, occupation, religion) and 3) health-related values and attitudinal factors (e.g., medical knowledge). *Enabling factors* include factors which promote or hinder use of services (e.g., income, health insurance, family support) and community resources (e.g., available heath care providers). *Need factors,* both perceived and evaluated, provide the basic stimulus for a person to seek health services.

We use Andersen's Behavioural Model of Health Care Utilization to frame our study hypothesis and to account for other factors that are known to affect women's health-seeking behavior.

Figure 1. Andersen's behavioural model of health care utilization (modified from Wallace et al. 2004)



The hypothesis behind this study postulates that a pregnant woman's knowledge of her HIV-positive status makes her more aware of her own and her unborn child's health risks and is enough to stimulate a significant change in her health-seeking behavior.

Specifically, the study addresses the following three objectives:

1. Describe the background characteristics of women who 1) had a live birth in the three years preceding the 2010-11 ZDHS, 2) were tested for HIV and 3) received the results during ANC
2. Determine the association between women's knowledge of their HIV-positive status and the number of ANC visits
3. Determine the association between women's knowledge of their HIV-positive status and place of delivery (health facility or elsewhere).

DATA AND METHODS

Data

This study uses secondary data from the 2010-11 ZDHS, which included a nationally representative sample of women age 15-49 and men age 15-49, The ZDHS was designed to provide estimates of population and health indicators at national and provincial levels. The survey included HIV testing as part of the interview process. A full description of the survey is provided elsewhere (ZMISTAT and ICFI 2012). As part of Zimbabwe further analysis, we sought and received authorization from ICF international to use the ZDHS 2010-11 datasets for this study. The analysis focuses on the data for women age 15-49 who gave birth in the three years preceding the ZDHS 2010-11, were tested for HIV during ANC and received the results.

Dependent Variables

Two indicators were used to measure how mothers make use of the available maternal health services: number of ANC visits, and place of delivery (health facility or elsewhere). The ZDHS dataset has the number of ANC visits reported as a continuous variable. We reported it as a dichotomous variable with two categories—one to three visits, and four or more visits. This was done to distinguish the women who attended the minimum number of visits recommended by the ANC protocol (four visits) from those who fail to do so (one to three visits). Place of delivery in the ZDHS dataset has many categories. We grouped these into a binary variable with the values, ‘institutional deliveries’ and ‘delivered elsewhere’.

Independent Variables

The key independent variable is knowledge of HIV-positive status. We construct this variable using data from the survey questions that ask women if they were tested for HIV during their last pregnancy and if they received the test results, as well as using the actual HIV test result obtained at the time of the 2010-11 ZDHS. We opted to construct the variable this way because the ZDHS does not record the actual test results during ANC; neither does it record the date of the test. We know, however, from the ANC protocol and programme data that the HIV test is offered during the first ANC visit; therefore, we assume the women who attended at least one ANC visit

had their test done during the first ANC visit. We further assume that the test result from the ZDHS is the same result that the women received during ANC.

We limit the study to births in the three years preceding the survey to reduce the chances of women having sero-converted between the time of pregnancy and the time of ZDHS HIV testing. Given the low HIV incidence rate among women post-delivery, 2.3 per 100 woman-years-at-risk with a 95% confidence interval of (1.1-4.1), we do not expect many of the women to have sero-converted in the three years preceding the survey (Munjoma et al. 2010).

The Andersen conceptual framework on use of health services was used to guide the inclusion of other independent variables listed below:

Predisposing Factors	Enabling Factors	Perceived Need	Use of Health Services
Religion	Household wealth	Knowledge of HIV status	ANC attendance
Age	Residence	Previous terminated pregnancy	Delivery in a health institution
Mother's education			
Occupation			
Marital status			
Parity			
Decision-making on health care			
Access to information			

Methods

The data analysis included bivariate and multivariate analysis. In the bivariate analysis we related the key independent variable to the dependent variables and tested for significant differences using the chi-square test of association.

The observed differences in the bivariate analysis could be a reflection of other variables associated with maternal health-seeking behavior. To isolate the impact of knowledge of HIV-positive status we used a multivariate analysis to control for the effect of other variables in the ZDHS dataset. We also employed logistic regression models and presented the odds ratios.

RESULTS

Study Sample

The ZDHS 2010-11 sample used in this study includes 2,362 women age 15-49 who had a birth in the three years preceding the survey and who were tested for HIV and received the results during pregnancy. Table 1 presents their background characteristics. Almost 13% of the 2,362 women tested positive for HIV at the time of the ZDHS. This percent is slightly lower than the 15% reported in the ZDHS for all women age 15-49 who received ANC in the three years preceding the survey. However, slightly over 10% (245) of the women selected for this study were not tested for HIV in the ZDHS, most likely because they refused the HIV test. The health-seeking behaviour of these women was analysed and is presented alongside that of the women who were tested for HIV.

More than two-thirds (68%) of the women in this study reside in urban areas and most (72%) have access to a source of information such as radio, newspapers and television. Looking at other background characteristics, the most common religion among the women is Apostolic sect (43%), followed by Pentecostal (19%) and Protestant (15%). The smallest proportion of respondents (10%) are age 15-19, while the largest proportion (32%) are age 20-24; the proportion declines with increasing age thereafter. Seventy-three percent of the women in the study have secondary education or higher, while 58% are unemployed.

Eighty-six percent of the women are either married or living with a partner. Twenty-one percent of the women reported that they are the sole decision maker when it comes to seeking health care; the majority (52%) stated that decision-making on health is done jointly with their husband or partner; and 27% of the women reported that their partner or someone else decides for them on health-seeking matters.

Table 1. Background characteristics of the sample of women

Women who had a birth in the three years preceding the survey, were tested for HIV and received the results during pregnancy, Zimbabwe DHS 2010-11

Characteristic	%	N	Characteristic	%	N
Knowledge of HIV status			**Province**		
HIV-negative	76.7	1,811	Manicaland	14.4	339
HIV-positive	12.9	305	Mashonaland central	10.8	254
No HIV result	10.4	245	Mashonaland east	9.5	224
Women's age at birth			Mashonaland west	11.4	268
15 to 19 years	9.5	224	Matabeleland north	5.3	125
20 to 24 years	32.1	757	Matabeleland south	6.0	141
25 to 29 years	28.6	675	Midlands	11.6	273
30 to 34 years	17.7	418	Masvingo	11.2	264
35 to 49 years	12.2	288	Harare	15.1	357
Women's education			Bulawayo	4.9	116
No education/primary	27.2	643	**Household wealth quintile**		
Secondary education or higher	72.8	1,719	Lowest (poorest)	18.6	439
Occupation			Second	19.3	456
Unemployed	58.8	1,390	Middle	20.1	474
Professional/sales/clerical	19.2	453	Fourth	23.6	557
Agriculture	10.3	243	Highest (richest)	18.5	436
Domestic/manual	11.0	259	**Residence**		
Don't know	0.7	16	Rural	32.5	766
Marital status			Urban	67.6	1,595
Married/living with partner	86.2	2,037	**Access to information**		
Divorced/separated/widowed	9.0	213	No access	28.3	669
Never married	4.8	112	Has access	71.7	1,693
Religion			**Previous terminated pregnancy**		
Roman Catholic	7.2	170	No	90.8	2,143
Protestant	14.8	348	Yes	9.3	218
Pentecostal	19.4	458	**Decision-making on health care**		
Apostolic sect	43.0	1,014	Woman alone	20.7	489
Other Christian	8.5	201	Joint with partner	52.0	1,227
Traditional/other/none	7.2	170	Partner alone	12.2	288
			Someone else/ not in union	15.2	358
Total number of women	**100.0**	**2,362**	**Total number of women**	**100.0**	**2,362**

Note: Ns are weighted; figures may not add to 100% due to rounding.

Results of Chi-Square Tests on ANC Visits and Place of Delivery

Table 2 presents the results from the chi-square test of association between 1) the number of ANC visits and knowledge of HIV status, and 2) the place of delivery and knowledge of HIV status. The results indicate that there is no significant association between use of maternal health services and knowledge of HIV status.

Table 2. Utilization of maternal health services according to women's HIV status

Among women with a birth in the three years preceding the survey who were tested for HIV and received the results during ANC, number of ANC visits during pregnancy for the most recent birth and place of delivery (health facility or elsewhere), according to knowledge of HIV status during ANC, Zimbabwe DHS 2010-11

	ANC visits during pregnancy for the most recent birth				Place of delivery for the most recent birth			
Characteristic	1 to 3 (%)	4+ (%)	N	*p*-value	Elsewhere (%)	Health facility (%)	N	*p*-value
Knowledge of HIV status								
HIV-negative	26.35	73.65	1,811	0.703	25.28	74.72	1,811	0.567
No HIV result	26.02	73.98	305		25.87	74.13	305	
HIV-positive	28.90	71.10	245		21.72	78.28	245	
Total number of women			2,362				2,362	

Results of Logistic Regression on Multiple Predictors of ANC Visits and Place of Delivery

We conducted logistic regression to adjust for multiple predictors of ANC visits and delivery in a health facility. Table 3 presents the results. Only variables found to be significant in any of the dependent variables were included in the table.

The results of the logistic regression indicate that HIV-positive women and HIV-negative women are equally likely to use available maternal health services. However, women who were not tested for HIV during the ZDHS 2010-11 were less likely to use available maternal health services than women who were tested for HIV during the survey. Specifically, for women who were not tested for HIV the odds of having at least four ANC visits or delivering in a health facility were about 0.40 compared with women who were tested and had an HIV-negative result.

Turning to other predictors, the results show that use of maternal health services increases significantly with increasing age of women. Women age 30-34 and women age 35-49 are, respectively, about 2.6 and 3.8 times more likely to have at least four ANC visits compared with women age 15-19. Women age 30-34 years and women age 35-49 are 1.8 and 2.9 times more likely to deliver in a health facility compared with women age 15-19.

Women with a secondary or higher education have greater odds of delivering in a health facility than women with primary education or less. Women's education is, however, not a statistically significant factor for attending four or more ANC visits. The results suggest that the chances of having at least four ANC visits and delivering in a health facility decrease with each pregnancy.

When compared with Roman Catholics, women from the Apostolic sect and traditional religions are less likely to have had at least four ANC visits. Despite this, no significant religious effects were seen for place of delivery.

Household wealth status, as measured by the DHS wealth index, was not a significant factor for attending at least four ANC visits. Differences are however noted for place of delivery, where the odds ratio increases by household wealth status. Women from the highest (richest) household quintile are about 2.5 times more likely to deliver in a health facility compared with women from the lowest (poorest) quintile.

Women residing in rural areas showed no significant difference in the number of ANC visits compared with their urban counterparts but they were less likely to deliver in health facilities. Likewise, access to a source of information (such as radio, newspapers and television) was a significant factor for delivering in a health facility but not so for having at least four ANC visits.

Other variables such as occupation, marital status, terminated pregnancy and decision-making on health did not show significant differences for having at least four ANC visits or delivering in a health facility.

Table 3. Predictors of utilization of maternal health services and women's health seeking behaviour

ANC attendance and place of delivery for HIV-positive women who had a birth in the three years preceding the survey, were tested for HIV and received the results, Zimbabwe DHS 2010-11

	Women with four or more ANC visits during pregnancy for the most recent birth				Place of delivery for the most recent birth			
Characteristic	**Odds ratio**	**95% CI**		***p*-value**	**Odds ratio**	**95% CI**		***p*-value**
Knowledge of HIV status (Ref. = HIV-negative)								
HIV-positive	1.00	0.74	1.34	0.990	0.90	0.63	1.27	0.546
No HIV result	0.38	0.30	0.49	0.000	0.40	0.30	0.54	0.000
Mother's age at birth (Ref. = 15 to 19 years)								
20 to 24 years	1.74	1.20	2.54	0.004	0.96	0.65	1.40	0.813
25 to 29 years	1.84	1.22	2.77	0.004	1.40	0.92	2.14	0.117
30 to 34 years	2.57	1.59	4.15	0.000	1.80	1.13	2.88	0.014
35 to 49 years	3.75	2.25	6.27	0.000	2.91	1.59	5.34	0.001
Mother's education (Ref. = No education/primary)								
Secondary education or higher	1.05	0.84	1.33	0.652	1.32	1.00	1.73	0.049
Parity	0.80	0.73	0.87	0.000	0.72	0.65	0.80	0.000
Religion (Ref. = Roman Catholic)								
Protestant	0.87	0.54	1.40	0.557	1.41	0.79	2.50	0.245
Pentecostal	0.76	0.45	1.29	0.308	1.25	0.69	2.25	0.465
Apostolic sect	0.56	0.36	0.87	0.009	0.76	0.45	1.27	0.289
Other Christian	1.05	0.62	1.79	0.855	0.95	0.53	1.71	0.869
Traditional/other/none	0.56	0.32	0.98	0.041	0.64	0.37	1.12	0.120
Wealth index (Ref. = Poorest, lowest 20%)								
Poorer	1.18	0.87	1.60	0.285	1.41	1.01	1.97	0.046
Middle	1.20	0.86	1.69	0.286	1.72	1.21	2.46	0.003
Richer	1.16	0.75	1.80	0.494	2.73	1.82	4.11	0.000
Richest	1.59	0.94	2.69	0.082	4.49	2.46	8.18	0.000
Residence (Ref. = Urban)								
Rural	0.88	0.59	1.33	0.556	0.36	0.21	0.63	0.000
Access to information (Ref. = No access)								
Has access	1.23	0.98	1.55	0.077	1.28	1.02	1.60	0.033

DISCUSSION

The results of this study indicate that women who know they are HIV-positive are not different from women who know they are HIV-negative when it comes to use of maternal health services. This finding refutes the study hypothesis—that knowledge of HIV-positive status stimulates use of maternal health services—and may have serious implications for PMTCT programmes and the overall fight to prevent maternal deaths.

Poor adherence to the focused antenatal protocol by HIV-infected pregnant women reduces the effectiveness of PMTCT interventions and increases the likelihood of HIV transmission to the baby. Poor adherence to HIV treatment during pregnancy may also increase the chances of developing HIV drug resistance in the future. Other studies have found less use of PMTCT services than antenatal care services among HIV-positive women (Birungi et al. 2011). Perhaps this is a clear indication of the overriding effect of other demographic and social factors, such as household income and urban-rural residence, commonly identified by other studies as determinants of use of maternal health services.

About 10 percent of the women who were tested and received their results during ANC were not tested for HIV during the ZDHS 2010-11. These women probably refused to give their blood for HIV testing because of having HIV-positive status, something that these data could not explore. The results of this analysis show that these women are less likely to have at least four ANC visits and deliver in a health facility. Could their refusal to give their blood for the HIV test during the survey be linked to the likelihood of not using maternal health services? Could it be that because they knew their HIV-positive status they felt that agreeing to give their blood during the survey was tantamount to a disclosure of their HIV status? This finding and the questions raised suggest a need for further studies with more comprehensive data to fully explore these research questions.

Simkhada et al. (2008) conducted a systematic review of 28 papers published between 1990 and 2006 highlighting factors affecting the use of antenatal care in developing countries. The factors most commonly identified as affecting antenatal care uptake included: maternal education, marital status, availability of services, household income, women's employment, media exposure and parity; having a history of obstetric complications was also found to be significant in this study.

In another literature review by Gabrysch and Campbell (2009), maternal age, education, household wealth, parity, place of residence, and obstetric complications were all found to be associated with use of delivery services. However, our results suggest this is not entirely the case with ANC visits, a key entry point for PMTCT programmes. Both household wealth status and rural residence were not significant predictors for having at least four ANC visits. These results suggest that, while addressing these factors for place of delivery can yield results to encourage institutional delivery, the focus should be elsewhere for use of ANC services.

This study has a number of limitations. We acknowledge that our construct of the key variable, *knowledge of HIV status*, although sufficient in the context, is not the best way to address the research questions. More revealing findings could be obtained through the use of a panel data set or a panel study, which allows for following women through from ANC to delivery, rather than a cross-sectional study as was used in this analysis.

CONCLUSION

Zimbabwe needs to increase efforts to improve early and consistent ANC attendance by all pregnant women, with a particular emphasis on HIV-infected women. A comprehensive plan is critical for reduction of maternal mortality and increased effectiveness of PMTCT interventions for HIV-positive pregnant and breastfeeding women.

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