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ABSTRACT

Background: The administration of intermittent preventive treatment of malaria in pregnancy (IPTp) using sulfadoxine-pyrimethamine (SP) has been implemented in Zimbabwe for some time but the coverage has been low. This study seeks to find what the predictors of IPTp uptake are among pregnant women who gave birth in the 24 months preceding the 2010-2011 Zimbabwe Demographic and Health Survey (ZDHS). The study compared uptake of IPTp nationally and in the IPTp targeted districts. IPTp targeted districts are the malaria zones in Zimbabwe, mainly districts bordering Mozambique and Zambia.

Methods: The study consisted of secondary analysis of the 2010-2011 ZDHS data. The study population was all women age 15-49 who had a live birth in the two years preceding the survey and had at least one antenatal care (ANC) visit.

Results: The proportion of women who had at least one IPTp dose in the national sample was significantly lower, at 15%, than in the IPTp targeted districts ($p < 0.001$), at 24%. In multivariate analysis, women's age group and gestational age at first ANC visit were statistically significant in predicting uptake of two or more IPTp doses nationally, while in the IPTp target districts no factor was significantly associated with receiving two or more doses.

Conclusions: The majority of pregnant women who gave birth in the two years preceding the survey did not receive SP for the prevention of malaria complication during pregnancy. There is a need for health education among women and communities on the importance of IPTp, and a need to book pregnancies early in the first trimester, inclusive of pregnant primigravidae mothers, to improve chances of pregnant women getting the recommended IPTp doses during pregnancy.

INTRODUCTION

The World Health Organization (WHO) in 2010 reported 219 million cases of malaria and 660,000 deaths from malaria globally (RBM 2013). Approximately half the world's population (3.3 billion) is at risk of contracting malaria, inclusive of pregnant women and children under age 5 (MOHCW 2014; RBM 2013). Malaria infection during pregnancy has been proven to cause low birth weight, miscarriages, anaemia, and maternal mortality (WHO 2007).

Zimbabwe experiences malaria transmission countrywide, mainly in the districts bordering Mozambique and Zambia. Annually, between 600,000 and 800,000 people in these areas suffer from malaria (WHO 2012). Malaria is the third leading cause of outpatient attendances at health facilities, and contributes to approximately 300 deaths annually in Zimbabwe (MOHCW 2014).

WHO recommends the administration of intermittent preventive treatment during pregnancy (IPTp) and prompt effective treatment of malaria in pregnant women (Nosten et al. 1999; WHO 2004; WHO 2012). IPTp using sulfadoxine-pyrimethamine ((SP) or also referred to as Fansidar) is given to pregnant women during antenatal care (ANC). WHO recommends that SP should be given at each scheduled ANC visit except during the first trimester. The first dose of three tablets ($IPTp_1$) can be administered within the 16th week of gestation, and dosage can be repeated every month at least one month apart—i.e. the second dose ($IPTp_2$) given within the 20th week of pregnancy—until the time of delivery (WHO 2013).

Zimbabwe has adopted all these interventions in addition to Indoor Residual Spraying (IRS) in targeted districts (MOHCW 2009).[1] IPTp is administered in line with WHO recommendations and is not given to HIV-positive women on cotrimoxazole prophylaxis, to avoid a theoretical increased incidence of adverse drug reactions (MOHCW 2010).

A study conducted in Malawi found that the use of IPTp was not associated with maternal side effects or perinatal complications. The results indicated that pregnant women who were given multiple doses of SP during pregnancy had reduced incidence of low birth weight infants born to primigravidae, even if the women had HIV infections (Peters et al. 2007).

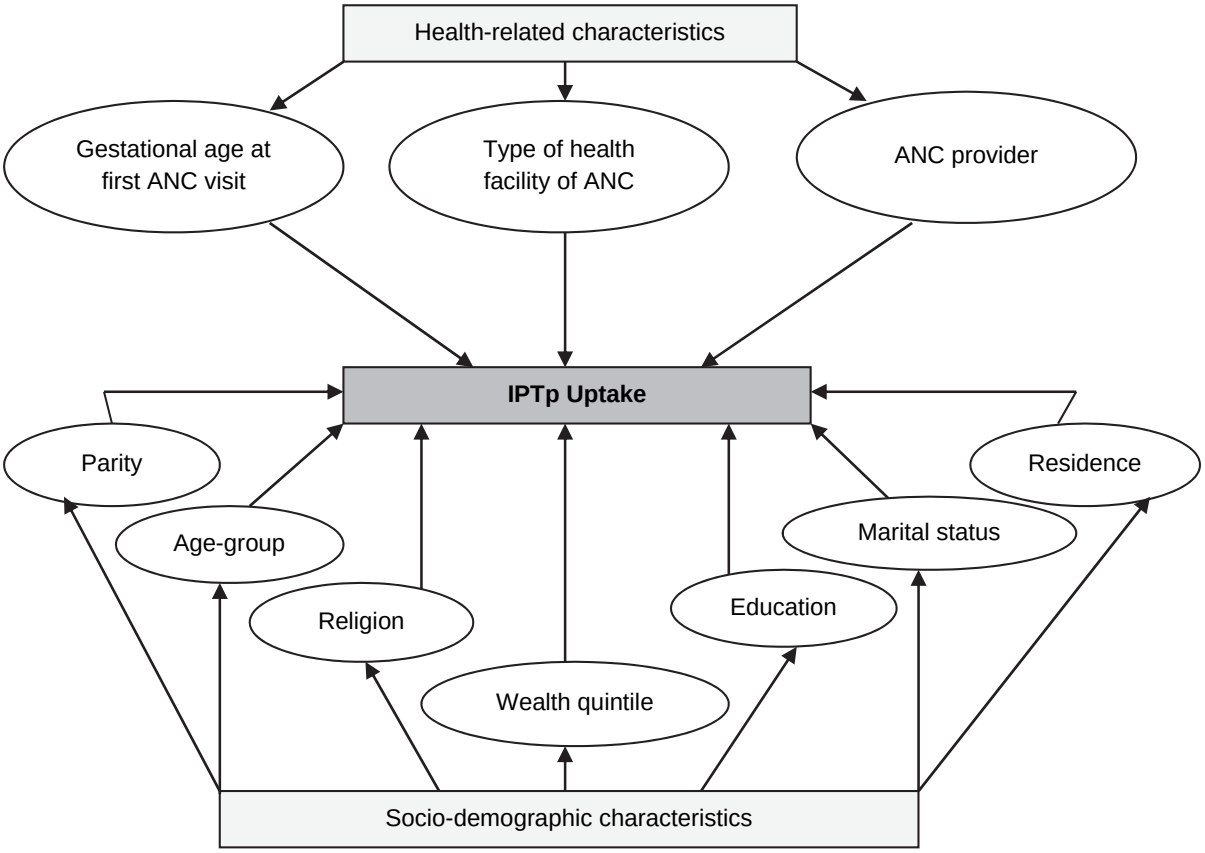
[1] WHO recommends at least four ANC visits for a pregnant woman.

Early ANC attendance increase chances of receiving the correct dose of IPTp, since health facilities have guidelines on malaria prevention in pregnancy. Mutulei (2013) using data from Kenya found that women starting antenatal visits in the second month of pregnancy had about 10.5 times the odds of having two or more doses of IPTp compared with those initiating antenatal attendance in the sixth month of pregnancy. Getting information on IPTp from health facilities increases the chance of women returning for more doses of IPTp (Mutulei 2013; Paintain et al. 2011).

According to WHO, in 2011 Zimbabwe had the lowest proportion of women receiving the second dose of IPTp ($IPTp_2$) among those attending ANC in Africa (WHO 2012). The 2010-2011 ZDHS showed varying IPTp coverage by province. $IPTp_2$ coverage is low and varied by area of residence. More so, time of first ANC visit is key in determining the total doses of IPTp a woman receives, as some women book late in the third trimester. Marital status, parity, religion, women's education, and household wealth quintile are some of the socio-demographic factors related to the number of IPTp doses received by pregnant women. Steketee et al. (1996) using data from Malawi reported that low-parity women, HIV-infected women, and those pregnant during the high malaria transmission season are most at risk of the adverse effects of malaria during pregnancy (Steketee et al. 1996).

This paper seeks to investigate the predictors of first dose ($IPTp_1$) and the second dose ($IPTp_2$) among pregnant women who gave birth within 24 months preceding the 2010-2011 ZDHS. The following conceptual framework guides this secondary analysis.

Figure 1. Conceptual framework



Research Question

- What are the predictors of first dose ($IPTp_1$) and second dose ($IPTp_2$) uptake among women in Zimbabwe in 2010-2011?

METHODS

Study Design

The study uses data from the 2010-2011 Zimbabwe Demographic and Health Survey (ZDHS). The 2010-2011 ZDHS is a nationally representative sample of nearly 11,000 households. The survey, conducted by the Zimbabwe National Statistics Agency (ZIMSTAT) from September 2010 through March 2011, provides updated estimates of basic demographic and health indicators in Zimbabwe.

The 2010-2011 ZDHS samples were selected using a stratified two-stage cluster design with enumeration areas as sampling units for the 1st stage and households for the 2nd stage. All women age 15-49 who were either permanent residents of the selected households or visitors who stayed in the households the night before the survey were eligible to be interviewed.

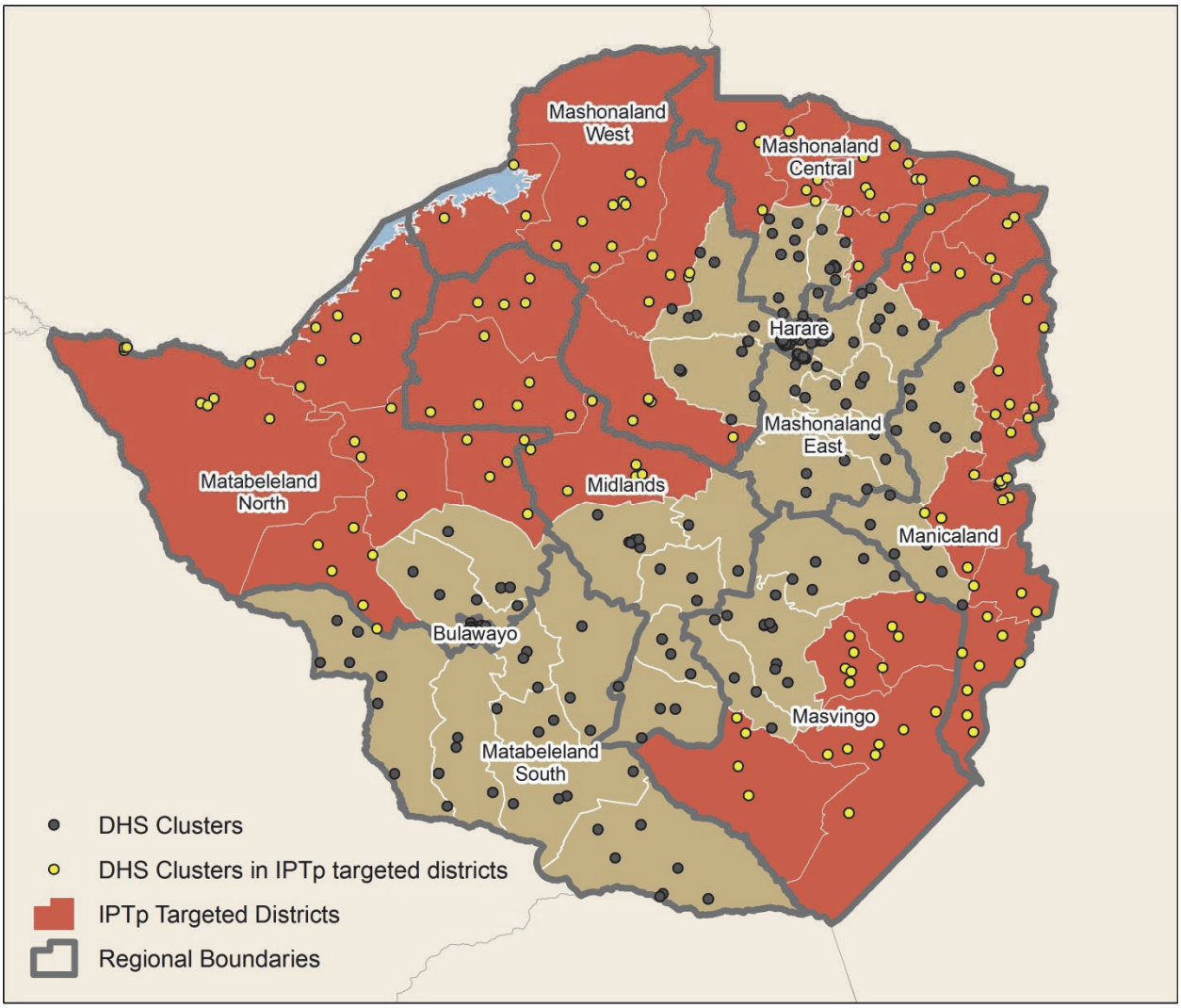
Definitions of Terms

A woman is considered to have taken a full IPTp course if she receives at least two doses of sulphadoxine-pyrimethamine (SP) during routine ANC visits in the second and third trimesters of pregnancy.

According to WHO, SP should be given at each scheduled ANC visit, except during the first trimester. As mentioned, the first dose of three tablets ($IPTp_1$) can be administered within the 16th week of gestation, and can be given every month thereafter, with the second dose ($IPTp_2$) given within the 20th week of pregnancy, until the time of delivery.

As shown in Figure 2, Zimbabwe's IPTp policy focuses on the 30 high-burden malaria districts in Zimbabwe (Figure 2).

Figure 2. Distribution of ZDHS clusters nationally and in the IPTp targeted districts



Outcome Variable

The outcome variable was defined as the number of IPTp doses received (none, at least one, and two or more doses).

Independent Variables

The independent variables considered in this study include health-related characteristics such as gestational age at 1st ANC visit, type of health facility for ANC, and ANC provider. In addition socio-demographic characteristics such as parity, women's age, religion, wealth quintile, marital status, educational level, and place of residence were included.

Analysis

The analysis included all women age 15-49 with a live birth in the two years preceding the survey and who made at least one ANC visit. The analysis was done for the national sample and the sample of IPTp targeted districts, to see whether uptake of IPTp was different in the high-burden malaria districts of Zimbabwe compared with the national uptake. The chi-square (χ^2) statistic was used to test the association between health-related characteristics and uptake of IPTp, and also between socio-demographic characteristics and uptake of IPTp. Multivariate logistic regression was used to determine the factors associated with IPTp uptake nationally and within the IPTp targeted districts. The analysis was done using STATA 13.

RESULTS

The number of women studied who had a live birth in the two years preceding the survey and who made at least one ANC visit was 2,142 nationally, and 920 in IPTp target districts. Table 1 shows the proportion of women nationally and in IPTp targeted districts by health-related and socio-demographic characteristics. In the national sample the proportion of women who had at least one IPTp dose was significantly lower, at 15%, than in the IPTp targeted districts, at 24% ($p < 0.001$). The majority of women received IPTp from the public health delivery system, both among all women at the national level (60%) and among women in the IPTp targeted districts (52%).

Table 1. Health-related and socio-demographic characteristics of women who had a live birth in the two years preceding the survey and who had at least one ANC visit, among all women and among women in targeted IPTp districts

	Total DHS sample		IPTp targeted districts	
Variable	**%**	**N**	**%**	**N**
HEALTH-RELATED CHARACTERISTICS				
Number of IPTp doses				
0	85.4	1,830	75.9	699
1	6.3	134	9.6	88
2+	8.3	178	14.5	133
Gestational age at 1st ANC visit				
0-3 months	18.1	387	17.3	159
4-5 months	42.2	904	44.4	408
6-7 months	32.7	701	33.2	306
8+ months	6.8	146	4.9	45
Don't know	0.2	3	0.2	2
Type of facility for ANC				
Hospital	30.9	662	28.1	259
Health Centre/Clinic	56.6	1,212	57.2	527
Private	3.8	82	1.8	17
Other	8.7	186	12.9	118
ANC provider				
Doctor	4.2	91	2.1	19
Nurse-midwife	16.1	344	15.8	145
Nurse	79.2	1,697	81.7	752
Village health worker	0.5	10	0.4	4

(Continued...)

Table 1. – *Continued*

Variable	Total DHS sample %	Total DHS sample N	IPTp targeted districts %	IPTp targeted districts N
SOCIO-DEMOGRAPHIC CHARACTERISTICS				
Age group				
15-19	11.8	254	10.5	97
20-34	75.8	1,624	75.5	694
35-49	12.4	265	14.0	129
Parity				
First births	29.5	632	25.0	230
Higher-order births	70.5	1,510	75.0	690
Marital status				
Not-married	16.1	344	13.1	120
Married	83.9	1,798	86.9	800
Educational level				
Primary school and less	30.8	660	40.4	372
Secondary school	65.8	1,409	57.1	526
More than secondary	3.4	74	2.5	23
Place of residence				
Urban	28.9	618	12.0	111
Rural	71.2	1,524	88.0	809
Religion				
Christian	48.2	1,032	44.6	411
Apostolic	43.7	935	45.5	418
Other	8.2	175	9.9	91
Wealth quintile				
Lowest	22.0	470	34.5	317
Second	21.0	450	24.8	228
Middle	18.7	401	18.0	166
Fourth	21.3	457	13.7	126
Highest	17.0	365	9.0	83
Total	**100.0**	**2,142**	**100.0**	**920**

Table 2 shows the percentage of women receiving at least one dose of IPTp and the percentage receiving two or more IPTp doses by health-related and socio-demographic characteristics, both in the national sample and in the IPTp targeted districts.

Factors that were statistically significantly associated with receiving at least one dose of IPTp in the national sample were type of health facility for ANC, age group, marital status, and place of residence. In the IPTp targeted districts sample, factors that were statistically significantly associated with receiving at least one IPTp dose were type of health facility for ANC, age group, and marital status.

In the national sample only gestational age at first ANC visit was statistically significantly associated with receiving two or more IPTp doses, and in the IPTp targeted districts only type of health facility for ANC was statistically associated with receiving two or more IPTp doses (Table 2).

Table 2. Percentage of women who had a live birth in the two years preceding the survey and who had at least one ANC visit who received at least one IPTp dose and percent who received 2+ doses, among all women and among women living in targeted IPTp districts

	Total DHS sample						IPTp targeted districts					
	Who received at least 1 dose of IPTp			Who received 2+ doses of IPTp			Who received at least 1 dose of IPTp			Who received 2+ doses of IPTp		
Variable	**%**	**chi-squared *p*-value**	**N**	**%**	**chi-squared *p*-value**	**N**	**%**	**chi-squared *p*-value**	**N**	**%**	**chi-squared *p*-value**	**N**
HEALTH-RELATED CHARACTERISTICS												
Gestational age at 1st ANC visit		0.100			0.022			0.597			0.240	
0-3 months	17.8		387	9.6		387	28.1		160	16.5		160
4-5 months	15.7		904	10.4		904	24.6		408	16.7		408
6-7 months	12.4		701	5.5		701	21.1		306	10.2		306
8+ months	9.5		147	5.8		147	(26.2)		45	(17.3)		45
Don't know	*		3	*		3	*		2	*		2
Type of health facility for ANC		0.014			0.052			0.033			0.026	
Hospital	17.1		662	9.5		662	26.9		259	15.54		259
Health centre/Clinic	12.3		1,212	7.2		1,212	20.4		527	12.6		527
Private	11.4		82	1.3		82	*		17	*		17
Other	21.7		186	14.7		186	33.4		118	22.5		118
ANC provider		0.688			0.743			0.807			0.899	
Doctor	14.0		91	6.8		91	*		19	*		19
Nurse-midwife	13.4		344	7.4		344	22.9		145	13.7		145
Nurse	14.9		1,697	8.6		1,697	24.3		752	14.7		752
Village health worker	*		10	*		10	*		4	*		4
SOCIO-DEMOGRAPHIC CHARACTERISTICS												
Age group		0.004			0.051			0.004			0.182	
15-19	7.6		254	4.4		254	11.4		97	9.3		97
20-34	15.3		1,624	9.0		1,624	26.4		695	15.7		695
35-49	16.7		265	8.1		265	20.9		129	11.8		129

(Continued...)

Table 2. – *Continued*

	Total DHS sample						IPTp targeted districts					
	Who received at least 1 dose of IPTp			Who received 2+ doses of IPTp			Who received at least 1 dose of IPTp			Who received 2+ doses of IPTp		
Variable	**%**	**chi-squared *p*-value**	**N**	**%**	**chi-squared *p*-value**	**N**	**%**	**chi-squared *p*-value**	**N**	**%**	**chi-squared *p*-value**	**N**
Parity		0.067			0.190			0.217			0.358	
First births	12.3		637	7.0		637	21.0		231	12.5		231
Higher-order births	15.5		1,506	8.9		1,506	25.1		689	15.1		689
Marital status		0.006			0.064			0.002			0.078	
Not-married	8.7		265	5.3		265	10.9		96	8.4		96
Married	15.4		1,877	8.7		1,877	25.6		824	15.2		824
Educational level		0.648			0.856			0.236			0.151	
Primary school and less	15.4		560	8.8		560	20.9		372	11.7		372
Secondary school	14.0		1,409	8.1		1,409	26.2		526	16.1		526
More than secondary	17.0		74	8.0		74	*		23	*		23
Place of residence		0.044			0.160			0.055			0.162	
Urban	11.2		618	6.2		618	34.7		111	22.1		111
Rural	15.9		1,524	9.2		1,524	22.6		810	13.5		810
Religion		0.356			0.249			0.083			0.181	
Christian	14.6		1,032	8.1		1,032	27.4		411	16.1		411
Apostolic	15.3		935	9.1		935	22.4		418	14.2		418
Other	10.6		175	5.3		175	16.6		91	8.4		91
Wealth quintile		0.418			0.304			0.087			0.663	
Lowest	16.2		470	10.2		470	19.0		317	12.2		317
Second	15.1		450	9.7		450	24.6		228	16.7		228
Middle	15.8		401	7.7		401	26.5		166	13.5		166
Fourth	14.0		457	7.1		457	32.1		126	17.0		126
Highest	11.3		365	6.4		365	25.1		83	15.4		83
Total	**14.6**		**2,142**	**8.3**		**2,142**	**24.1**		**920**	**14.5**		**920**

Note: Figures in parentheses are based on 25-49 unweighted cases and an asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

In the multivariate analysis (Table 3), the factors that were statistically significantly associated with receiving at least one IPTp dose in the national sample included type of health facility for ANC, women's age group, and marital status. In the IPTp targeted districts sample, age group and marital status were statistically significant in predicting receiving at least one IPTp dose.

In the national sample, women who received ANC in a clinic were 32% times less likely to receive at least one dose of IPTp compared with women who received ANC at a hospital, controlling for other confounding variables (AOR=0.68, 95% CI: 0.48-0.93), and this was statistically significant (p=0.017). Women age 20-34 were 2.12 times more likely to receive one IPTp dose compared with women under age 20 (AOR=2.12, 95% CI: 1.27-3.54), and this was statistically significant (p=0.004). Women age 35-49 were 2.29 times more likely to receive at least one dose of IPTp compared with women under age 20 (AOR=2.29, 95% CI: 1.25-4.24), and this was statistically significant (p=0.008). Being married was associated with receiving at least one dose of IPTp compared with not being married (AOR=1.73, 95% CI: 1.07-2.80), and this was statistically significant (p=0.025).

In the IPTp targeted districts sample, factors that were statistically significantly associated with receiving at least one IPTp dose were women's age group and marital status. Women age 20-34 were 2.34 times more likely to receive one IPTp dose compared with women under age 20 (AOR=2.34, 95% CI: 1.21-4.57), and this was statistically significant (p=0.012). Married women were 2.60 times more likely to receive one IPTp dose compared with unmarried women (AOR=2.60, 95% CI: 1.30-5.19), and this was statistically significant (p=0.007).

Factors that were associated with receiving two or more doses of IPTp in the national sample were gestational age at first ANC visit and women's age group. In the IPTp targeted districts no factor was significantly associated with receiving two or more doses of IPTp.

Table 3. Adjusted odds ratios of receiving at least 1 IPTp dose and of receiving 2+ doses among women who had a live birth in the two years preceding the survey and had at least one ANC visit in the total DHS sample and among women living in targeted IPTp districts

	Total DHS sample								IPTp targeted districts							
	Who received at least 1 dose of IPTp				Who received 2+ doses of IPTp				Who received at least 1 dose of IPTp				Who received 2+ doses of IPTp			
Variable	**AOR**	**95% CI**		***p*-value**	**AOR**	**95% CI**		***p*-value**	**AOR**	**95% CI**		***p*-value**	**AOR**	**95% CI**		***p*-value**
HEALTH-RELATED CHARACTERISTICS																
Gestational age at 1st ANC visit																
0-3 months	1.00				1.00				1.00				1.00			
4-5 months	0.87	0.60	1.28	0.486	1.05	0.69	1.61	0.805	0.85	0.52	1.40	0.533	0.97	0.59	1.59	0.913
6-7 months	0.68	0.43	1.06	0.084	0.54	0.30	0.97	**0.038**	0.71	0.41	1.24	0.231	0.58	0.30	1.11	0.102
8+ months	0.53	0.28	1.01	0.054	0.60	0.27	1.31	0.199	0.86	0.39	1.89	0.704	0.96	0.36	2.51	0.928
Type of health facility for ANC																
Hospital	1.00				1.00				1.00				1.00			
Health Centre/Clinic	0.68	0.48	0.93	**0.017**	0.73	0.48	1.11	0.119	1.74	0.49	1.12	0.156	0.84	0.51	1.39	0.491
Private	0.69	0.26	1.82	0.457	0.12	0.02	0.90	**0.039**	1.09	0.39	3.07	0.867	-	-	-	-
Other	1.25	0.74	2.08	0.402	1.56	0.83	2.90	0.164	0.50	0.85	2.63	0.161	1.71	0.82	3.59	0.153
ANC provider																
Doctor	1.00				1.00				1.00				1.00			
Nurse-midwife	0.98	0.45	2.13	0.965	0.80	0.28	2.34	0.688	0.88	0.30	2.63	0.820	1.77	0.49	3.16	0.712
Nurse	1.04	0.49	2.20	0.925	0.85	0.30	2.39	0.762	0.89	0.32	2.51	0.832	0.76	0.19	2.95	0.688
SOCIO-DEMOGRAPHIC CHARACTERISTICS																
Age group																
<20	1.00				1.00				1.00				1.00			
20-34	2.12	1.27	3.54	**0.004**	2.03	1.10	3.74	**0.023**	2.34	1.21	4.57	**0.012**	1.35	0.62	2.92	0.451
35-49	2.29	1.25	4.24	**0.008**	1.80	0.84	3.86	0.132	1.91	0.92	3.94	0.081	0.99	0.40	2.45	0.991

(Continued...)

Table 2. – *Continued*

	Total DHS sample								IPTp targeted districts							
	Who received at least 1 dose of IPTp				Who received 2+ doses of IPTp				Who received at least 1 dose of IPTp				Who received 2+ doses of IPTp			
Variable	**AOR**	**95% CI**		***p*-value**	**AOR**	**95% CI**		***p*-value**	**AOR**	**95% CI**		***p*-value**	**AOR**	**95% CI**		***p*-value**
Parity																
First births	1.00				1.00				1.00				1.00			
Higher-order births	1.02	0.72	1.43	0.923	1.04	0.67	1.62	0.866	1.04	0.70	1.54	0.857	1.20	0.70	2.04	0.507
Marital status																
Not-married	1.00				1.00				1.00				1.00			
Married	1.73	1.07	2.80	**0.025**	1.54	0.85	2.79	0.150	2.60	1.30	5.19	**0.007**	1.94	0.89	4.27	0.097
Educational level																
Primary and less	1.00				1.00				1.00				1.00			
Secondary school	0.93	0.70	1.26	0.673	0.99	0.69	1.42	0.947	1.09	0.75	1.59	0.645	1.31	0.85	2.02	0.222
More than secondary	1.14	0.47	2.79	0.768	1.26	0.39	4.12	0.704	0.86	0.25	2.95	0.808	1.98	0.52	7.51	0.314
Place of residence																
Urban	1.00				1.00				1.00				1.00			
Rural	1.39	0.81	2.37	0.232	1.18	0.56	2.48	0.667	0.65	0.30	1.37	0.253	0.46	0.17	1.26	0.130
Religion																
Christian	1.00				1.00				1.00				1.00			
Apostolic	0.98	0.72	1.33	0.891	1.04	0.72	1.51	0.814	0.81	0.55	1.17	0.259	0.92	0.60	1.41	0.695
Other	0.66	0.38	1.16	0.148	0.62	0.31	1.25	0.186	0.63	0.32	1.23	0.175	0.61	0.27	1.38	0.232
Wealth quintile																
Lowest	1.00				1.00				1.00				1.00			
Second	0.91	0.61	1.36	0.648	0.91	0.56	1.49	0.710	1.37	0.88	2.14	0.165	1.34	0.77	2.34	0.296
Middle	1.00	0.66	1.51	0.990	0.73	0.42	1.25	0.245	1.28	0.77	2.15	0.338	0.92	0.48	1.76	0.801
Fourth	1.01	0.64	1.62	0.955	0.78	0.45	1.33	0.357	1.34	0.68	2.66	0.397	0.80	0.37	1.74	0.576
Highest	0.80	0.43	1.49	0.473	0.72	0.32	1.61	0.422	0.92	0.39	2.20	0.854	0.69	0.23	2.14	0.524

For the national sample, women who had a first ANC visit between six and seven months of pregnancy were 46% less likely to receive two or more doses of IPTp compared with women who had their first visit within three months of pregnancy, controlling for other confounding variables (AOR=0.54, 95% CI: 0.30-0.97), and this was statistically significant (p=0.038). Women age 20-34 were 2.03 times more likely to receive two or more doses of IPTp compared with women under age 20 (AOR=2.03, 95% CI: 1.10-3.74), and this was statistically significant (p=0.023).

In the national sample the odds of receiving two or more doses of IPTp versus no IPTp and one dose of IPTp combined were 0.68 times lower for women who received ANC at a clinic compared with at a hospital, keeping other variables in the model constant, and this was statistically significant, p=0.022. For married women, the odds of receiving two or more doses of IPTp versus the combined zero IPTp and one IPTp were 1.72 times greater than for unmarried women, controlling for other variables in the model, and this was statistically significant, p=0.027. Women age 20-34 age and women age 35-49 had higher odds of receiving two or more doses of IPTp compared with women under age 20 (OR=2.12, 95% CI: 1.28-3.53) and (OR=2.24, 95% CI: 1.22-4.11), respectively, and this was statistically significant.

In the IPTp targeted districts only women age 20-34 had statistically significantly higher odds of receiving two or more doses of IPTp compared with women under age 20, controlling for other variables in the model (OR=2.22, 95% CI: 1.12-4.37), p=0.022.

DISCUSSION

Both in the general Zimbabwe population and in the IPTp districts, the majority of pregnant women registered for the first time at ANC after the second and third trimester. This is similar to a study in Uganda, where 69% of women received only one dose of IPT because they reported to the health centre for the first ANC visit after the first trimester (Steketee et al. 1996).

Gestational age at first ANC visit is important. If women report early for ANC, they can get the first dose of IPTp and receive health information, making it more likely that they will report for the second and subsequent doses. This is also associated with women's age. Younger pregnant women present later for ANC booking than older mothers, with more pregnancies, who tend to use the health delivery system early and are more likely to use it consistently.

Women who are primigravidae tend to deliver for the first time at their rural maternal home, as tradition requires, and as a result they may not receive IPTp. This is similar to a study in Ghana, where parity was found to be associated with the number of SP doses received (Steketee et al. 1996). Multigravidae women tend to use the public health delivery system and in their first visit mothers receive information on IPTp from health workers, and thus are more likely to return for subsequent doses (Steketee et al. 1996).

The choice of ANC for most pregnant women has been clinics, which are easily accessible in most communities, although about one woman in every three (31% in general population and 28% in the IPTp targeted districts) received ANC at a hospital. Attending a health facility for ANC is important in that advocacy for IPTp during ANC is done in the public health sector. Though private health facilities are thought to offer better quality health care compared with the public health sector. ANC at a health clinic is associated with receiving at least one dose of IPTp compared to those that had ANC at a hospital. The significance of this is that women who do not attend ANC or report late would miss the timing of the 1st IPTp dose.

Women who attend ANC early in their pregnancies would be predicted to receive two or more doses of IPTp, as they would be more likely to know its benefits. These findings agree with a recent study in Kenya, where attending ANC in the second month of pregnancy and obtaining health information from a health centre were associated with better chances of obtaining two or more doses of IPTp (Mutulei 2013). Malaria is prevalent in most rural districts of Zimbabwe, and

the type of health care facility in these areas where pregnant women receive IPTp is mainly the public health sector, owned by the government or rural district councils.

Married women and older women tend to receive two or more doses of IPTp, since these groups are exposed to this program through health education campaigns and thus would know the benefits of receiving the correct doses of IPTp. Psychosocial support from family and especially spouses contributes to good health-seeking behaviour. Thus married couples are more likely to visit the hospital for ANC and subsequently receive IPTp. Furthermore, married women receive the necessary financial support from their spouses enabling them to visit the health facility and pay for the services. These results are comparable to a study in Kenya by Mutulei (2013), which found that partner support for pregnant women was associated with an increased chance of receiving two doses of IPTp compared with women who did not receive support (OR= 8.02) (Mutulei 2013).

CONCLUSION

This extended analysis of the 2010-2011 ZDHS has shown that women's age and type of health facility for ANC are key predictors associated with the number of IPTp doses that pregnant women receive during ANC. The older the woman, being multigravidae, and receiving ANC at a health clinic are associated with higher chances of receiving at least one dose of IPTp. Most women report to a health centre after the first trimester, however, and this late booking contributes to lower proportions of women receiving the recommended two or more doses of IPTp. Married women with psychosocial, moral, and financial support from family and their spouses are more likely to attend ANC early and hence have better chances of getting at least two doses of IPTp.

We thus recommend more concerted efforts to educate women and communities on the importance of IPTp and the need to book pregnancies early in the first trimester, inclusive of pregnant primigravidae mothers. This improves the chances that pregnant women will receive health education, which will enable more of them to get at least two doses of IPTp due to longer contact with the health delivery system.

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