Can religion kill? The association between membership of the Apostolic faith and child mortality in Zimbabwe

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Abstract

Existing literature has been equivocal about the effect of religion on utilization of health service and health outcomes. While followers of *particularized theology hypothesis* believe that doctrinal teachings, beliefs and values of religious groups directly influence health access and outcomes, the advocates of the *selectivity hypothesis* claim that the observed disparities between religious groups mainly reflect differential access to social and human capital which in turn determines health access and outcome rather than religion *per se.* Using household data from the Zimbabwe Multiple Indicator Monitoring Survey 2009, we find that household heads' affiliation with apostolic faith put children under five years old at greater risk of death compared to other religious groups. This effect remains strong even after controlling for a wide range of socio-economic and demographics characteristics of the households in multivariate logit regressions.

Introduction

Africa is poised to be among the most religious continent and the role of religion on health seeking and health outcomes has been given increasing attention in the literature.[1-4] Results from the previous studies has been equivocal: followers of *particularized theology hypothesis* who consider doctrinal teachings, beliefs and values of religious groups directly influence health outcomes while the followers of the *selectivity hypothesis* claim that disparities in observed behaviour between religious groups mainly reflect differential access to social and human capital which in turn determines health access and outcome rather than religion *per se.*[5-8]

Zimbabwe provides an interesting case to examine the relationship between religion and health. During the first decade's its independence (1980-1990), Zimbabwe built one of the best basic social service systems in Africa. However, the next ten years saw these achievements gradually eroded by the structural adjustment programs with associated austerity measures and the onset of the HIV epidemic. In the new century, the dramatic economic implosion and political instability have resulted in a total collapse of the social service systems in 2007/2008.

In the meantime, Zimbabwe's religious landscape were redrawn. The Apostolic Churches which sought independence from missionary churches on doctrinal grounds such as spiritual healing and *Jordan baptism*[9-11] has become a formidable religious force in Zimbabwe especially during the crisis years. Available Demographic and Health Surveys and the Multiple Indicator Cluster Survey (MICS) show that a rather rapid growth of the group from 20% of the population in 1994 and 21.5% in 1999 to 27% in 2009 and 32.8% in 2014. Apostolic churches in Zimbabwe has been known to affect adherents' health access and health outcomes in several ways. Firstly, the churches provide necessary social support to their members in times of great change or adversity which can positively support improved physical and mental health.[12] Secondly, their strict doctrine and moral codes on sexual behaviour may offer perceived protection from HIV infection. Lastly, but most pertinent to our focus on child mortality, Apostolic churches emphasize prophet-healing through prayers and the action of the Holy Spirit. Any use of western and modern medicine is seen as exhibiting little faith in God and is strongly prohibited. Despite recent changes in ideology aimed at improving access to health services for members of the Apostolic faith and spearheaded by the Union for the Development of Apostolic Churches in Zimbabwe (UDA-CIZA), traditional beliefs still prevail especially among the ultra-conservative Marange and Madhidha Apostolic groups.[13] These deleterious impacts on access to health and health outcomes can be exacerbated by the asymmetric power that the churches bestow to men and husbands, which constrains women's decision-making in relation to health.

This research contribute to the literature on the relationship between the Apostolic faith and under five mortality in Zimbabwe in two important ways: first, unlike earlier studies in Zimbabwe context,[14,15] we control for a large set of mediating factors that simultaneously influence religion and child mortality to isolate the effects of apostolic faith on child mortality. Second, we use nationally representative household survey data from Zimbabwe to ensure the external validity of our results.

Materials and Methods

Data

This study utilises data from the Multiple Indicator Monitoring Survey (MIMS) of 2009. MIMS 2009 is a customised version of the Multiple Indicator Cluster Survey (MICS), a worldwide survey programme. MICS is designed to collect statistically sound data to assess the situation of children and women in the areas of education, health, gender equality, rights and protection. MIMS is a nationally representative survey implemented by the Zimbabwe National Statistics Agency (ZIMSTAT). The survey interviewed 11,469 households, from these households 11,339 women aged 15-49 years. We constructed the analytical sample of 6366 births for the study from the women's birth histories on children born five years prior to the survey.

The MIMS asked women aged 15-49 years to give a record of all births whether still alive or not in their lifetime. A follow up question is asked on whether the births are still alive or not. This analysis considered all births within five years prior to the

survey. A binary outcome variable was constructed for under-five mortality cases or otherwise at the time for the survey. In accordance with the survey only deaths from live births were counted as mortality cases.

Analysis

A logit model was applied on the dichotomous outcome variable. The key independent variable to the study is the religious affiliation of the household head following Ha et al.[16] Religious affiliation as recorded in MIMS 2009 was reclassified into four categories; i) *Other Christians* which combines Roman Catholic, Protestants, Pentecostal and Other Christians; ii) Apostolic grouped was retained as is; iii) the Traditional religion; iv) other religions including Muslim and those with no religion were grouped together as *Other religions and no religion*.

Guided by Millard[17] we limit the analysis to ultimate tier factors as we do not intend to explore the interaction of various factors but more on the context. According to Millard[18] ultimate factors consists of the broad economic social, and cultural processes and structures that shape the context in which the proximate and intermediate tiers factors operate. Proximate and intermediate tier factors are the more direct influencers of child mortality.

We further categorise the ultimate tier factors in the language of Andersen[19] as pre-*disposing* and *enabling factors*. *Predisposing factors* include demographic (age, sex, marital status, *etc*.), social structural (education, ethnicity, occupation, religion etc) and health related attitudinal factors (*e.g.* medical knowledge and other maternal factors). *Enabling factors* include factors, which promote or hinder use of services such as income, health insurance and family support as well as community resources (*e.g.* available heath care providers).

In this study, *predisposing factors* include mothers' age at birth of child, marital status, education level and occupation, sex of the child, whether child is first birth, presence of siblings under five years in the sample. Five year age categories are defined for mother's age at birth of child with those 35 years and above in one group. Marital status of mother was reclassified into a binary variable: 0) married and living with partner, 1) single/never married and formerly married *i.e.* separated, divorced or widowed. Mother's occupations were defined as: paid employees (both casual and permanent employees plus employers); own account workers; unpaid family workers and the unemployed (students, retirees and

homemakers). Mother's education was recorded into two groups; without education and primary educated as one group, and secondary and higher educated as one group. A binary variable was created from the birth history data to capture siblings in the data set; those with no siblings under the age of five was coded zero otherwise coded one. A variable, first birth, was also created to capture the order of births. First birth was coded one for first birth otherwise coded zero.

Enabling factors include household urban residence, wealth quintile, province, household dependency ratio and value of medical assistance received. Urban residence was based on the location of each household interviewed (1=urban, 0=rural). The wealth quintile is a composite index derived from a set of household characteristics available among MIMS data using Principal Component Analysis (PCA) tech-

Table 1. Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variable					
Under five mortality	6366	0.062	0.241	0	1
Independent variables					
Predisposing factors					
Religion of Household Head					
Other Christians	6366	0.393	0.489	0	1
Apostolic region	6366	0.330	0.470	0	1
Traditional	6366	0.081	0.273	0	1
Other religions and no religion	6366	0.196	0.397	0	1
Child sex (1=boy)	6366	0.506	0.500	0	1
Mother's age at birth					
<20	6366	0.187	0.390	0	1
20-24	6366	0.344	0.475	0	1
25-29	6366	0.233	0.423	0	1
30-34	6366	0.139	0.346	0	1
>35	6366	0.097	0.295	0	1
Mother marital status (1=single)	6366	0.135	0.342	0	1
Mother's occupation					
Paid employee	6366	0.171	0.377	0	1
Own account worker (agriculture related)	6366	0.544	0.498	0	1
Own account worker (other)	6366	0.160	0.367	0	1
Unpaid family worker	6366	0.029	0.166	0	1
Unemployed	6366	0.097	0.295	0	1
Mothers's education					
No/primary	6366	0.369	0.482	0	1
Secondary/higher	6366	0.631	0.482	0	1
Siblings under-five (1=yes)	6366	0.434	0.496	0	1
First birth (1=yes)	6366	0.772	0.420	0	1
Enabling factors					
Urban residence	6366	0.276	0.447	0	1
Wealth Quintile					
Poorest	6366	0.258	0.437	0	1
Second	6366	0.217	0.413	0	1
Middle	6366	0.171	0.376	0	1
Fourth	6366	0.201	0.401	0	1
Highest	6366	0.153	0.360	0	1
Province					
Bulawayo	6366	0.033	0.179	0	1
Manicaland	6366	0.148	0.355	0	1
Mashonaland central	6366	0.117	0.322	0	1
Mashonaland east	6366	0.093	0.291	0	1
Mashonaland west	6366	0.108	0.310	0	1
Matebeleland north	6366	0.063	0.243	0	1
Matebeland south	6366	0.056	0.231	0	1
Midlands	6366	0.121	0.326	0	1
Masvingo	6366	0.121	0.327	0	1
Harare	6366	0.140	0.347	0	1
Household dependency ratio	6366	1.314	0.928	0	9
Medical assistance received in 100 US dollars	6366	0.015	0.149	0	8.571

0/1 variables are dummy variables representing the absence or presence of each of the variables of interest. Medical assistance was measured in 100 United States dollars.

niques.[20] Wealth quintile and province variables were taken as they were originally defined in the MIMS data set. A set of dummy variables was included for each of the 10 provinces. The Household dependency ratio was defined as the ratio of economically inactive household members (those aged less than 15 years and those above 64 years) to economically active members (those aged 15 to 64 years). The value of medical assistance received was computed from the reported financial assistance towards medical care received by households from friends, relatives, employers or organizations. The reported amounts were converted to United States dollars using the exchange rates prevailing at the time of the survey and presented in units of 100 United States dollars for ease of understanding.

Table 1 gives the summary statistics for the sample of women used to analyse the relationship under-five mortality and religious affiliation. The total number of births within five years preceding the survey which were included in the analysis was 6366 after excluding observations with missing values in any of the independent

Table 2. Effects of religion on under-five mortality.

| Independent variables reference group in parenthesis | | Under–five mortality | |
Specification 1	Specification 1	Specification 2	Specification 3
Predisposing factors			
Religion of household head (other Christian groups)			
Apostolic sect	0.030***	0.025***	0.025***
	(0.008)	(0.008)	(0.007)
Traditional	−0.002	−0.007	−0.007
	(0.013)	(0.013)	(0.013)
Other religions and no religion	0.010	0.003	−0.001
	(0.009)	(0.009)	(0.009)
Child sex (Boy=1)			0.005
			(0.006)
Mothers age at birth (<20)			
Mothers age at birth 25-29			0.039***
			(0.011)
Mothers age at birth 30-34			0.049***
			(0.011)
Mothers age at birth >35			0.040***
			(0.013)
Marital status (1=single)			0.033***
		(0.011)	
Mother's education (1=secondary/higher)			−0.011*
		(0.006)	
First birth (1=yes)			0.035***
		(0.007)	
Siblings under5 (1=yes)			0.100***
		(0.007)	
Enabling factors			
Wealth quintile (lowest quintile)			
Second		−0.026***	−0.023**
		(0.009)	(0.009)
Middle		−0.026***	−0.020**
		(0.009)	(0.009)
Fourth		−0.019	−0.018
		(0.012)	(0.013)
Highest		−0.035**	−0.030**
		(0.016)	(0.016)
Medical assistance received in 100 US$		0.021**	0.026***
		(0.009)	(0.009)
Household dependency ratio			−0.026***
			(0.004)
Mother's occupation (paid employee)			
Agriculture own account worker			−0.017*
			(0.009)
Other own account worker			−0.005
			(0.009)
Unpaid family worker			−0.024
			(0.019)
Unemployed			−0.004
			(0.011)
Urban residence		−0.000	−0.001
		(0.015)	(0.014)
Observations	6366	6366	6366

Specification 1 shows marginal effects from logit regression with religion only. Specification 2 includes religion and enabling variables only, Specification 3 includes the full model with all predisposing and enabling factors. Categorical variables start with a variable heading. Reference levels for categorical variables are given in parenthesis next to the variable heading. Standard errors, clustered by district, are given in parentheses. Significance levels are as follows: ***P<0.01, **P<0.05, *P<0.1.

variables included in the multivariate analysis. A third of the study sample were births from women who lived in households headed by followers of the Apostolic faith while births by women from Other Christians accounted for thirty nine percent of the total births. Women from No religion and other smaller religions accounted for about one fifth of the births. This is in line with religious populations in Zimbabwe.

Results

Multivariate analysis of child mortality and apostolic faith

Table 2 presents results of logit models for under-five mortality and religious affiliation. Specification 1 uses religious affiliation only. Specification 2 adds wealth variables, while specification 3 include religion and all the enabling factors and specification 4 is the full model including all the predisposing factors and the enabling factors. The table shows only the impact of religious affiliation and other significant mediating factors on under-five mortality. The full model results are available upon request from the authors.

Predisposing factors

In the absence of other control variables, affiliation to the Apostolic faith increased the likelihood of a child death compared to the other Christians. Children born to women from the Apostolic faith were about 3.0 percentage points more likely to die compared to other Christian groups. When wealth variables are controlled for, this gradient of apostolic religion attenuated slightly to 2.7 percentage points in specification 2. The full model shows that children born to women associated from the apostolic faith were 2.5 percentage points more likely to die before reaching age five.

Children born to older women (>25 years) caretakers were shown to have an increased likelihood to die before their fifth birthday compared to children born to young women aged less than 20 years old. Children born to women aged 25-29 years were about 4 percentage points less likely to die compared to those born to women aged below 20 years. Likewise, children under born to women aged 30-34 were about five percentage points more likely to die by their firth birthday compared to children born to women at the age of less than 20 years respectively. First births have a higher risk of dying before their fifths birthday by about 3 percentage points. Even higher risk of child death for children with other siblings below the age of five. Children with

Table 3. Correlation matrix of key variables.

	Other Christian groups	Apostolic sect	Traditional	Other and no religion	Child sex (1=male)	Marital status single	First birth (1=yes)	Siblings under 5 (1=yes)	Primary or higher	Dependence ratio	Urban residence	Lowest	Second	Fourth	Highest
Apostolic sect	-0.565*	1													
Traditional	-0.240*	-0.209*	1												
Other and no religion	-0.397*	-0.346*	-0.147*	1											
Child sex (1=male)	-0.017	-0.009	-0.002	0.032*	1										
Marital Status Single	0.029*	0.009	0.012	-0.054*	-0.022	1									
First birth (1=yes)	0.047*	-0.047*	-0.006	0.003	-0.034*	0.026*	1								
Siblings under5 (1=yes)	-0.071*	0.065*	0.016	0.000	0.002	-0.042*	-0.619*	1							
Primary higher	0.233*	-0.063*	-0.167*	-0.099*	-0.023	-0.049*	0.055*	-0.091*	1						
Dependence ratio	-0.070*	0.102*	0.041*	-0.072*	-0.017	0.127*	-0.141*	0.218*	-0.169*	1					
Urban residence	0.229*	-0.117*	-0.153*	-0.039*	0.009	-0.067*	0.085*	-0.136*	0.352*	-0.225*	1				
Lowest	-0.179*	0.065*	0.147*	0.042*	0.011	0.017	-0.098*	0.147*	-0.306*	0.176*	-0.358*	1			
Second	-0.080*	0.074*	0.026*	-0.007	-0.015	-0.002	-0.025*	0.050*	-0.088*	0.052*	-0.321*	-0.311*	1		
Fourth	0.107*	-0.055*	-0.084*	-0.009	0.023	-0.013	0.038*	-0.061*	0.177*	-0.146*	0.393*	-0.295*	-0.264*	1	
Highest	0.210*	-0.111*	-0.114*	-0.049*	-0.014	-0.071*	0.078*	-0.127*	0.294*	-0.172*	0.623*	-0.251*	-0.225*	-0.213*	1
Medical assistance (in 100US$)	0.025*	-0.007	0.001	-0.023	0.014	0.001	0.019	-0.031*	0.023	-0.026*	0.069*	-0.010	-0.036*	0.055*	0.016

*Significant at 1%

siblings below the age of five years were about 10 percentage points more likely to die by their fifth birthday.

Marital status of the mother also emerged as a significant factor to the likelihood of a child dying between birth and their fifth birthday. Children born to single mothers (never married, divorced, separated or widowed) women were about four percentage points more likely to die before their fifth birthday compared to children born to married women. Looking at the correlation matrix in Table 3, single marital status is positively correlated (0.127, P<0.05) with dependency ratio.

Enabling factors

For enabling factors, wealth quintile, dependency ratio and medical assistance received were the significant predictors. Wealth quintile was the most significant predictor in explaining likelihood of child death before their fifth birthday. In general, family wealth is a significant factor, which tend to cushion children from dying before turning five years. Children from richer families are less likely to die compared to children from poor families by between two to three percentage points. To put the estimates into context of the paper, the gradient between the lowest wealth quintile and the second wealth quintile on the probability of is comparable to the gradient between other Christian groups and the Apostolic faith on the probability of dying between birth and the fifth birthday.

The household dependency ratio had a negative impact on the likelihood of chil-dren dying before their fifth birthday. A unit increase in the household dependency ratio results in up to about three-percentage points reduction in the probability of a child dying. Financial assistance received by a household for medical expenses is associated with significantly higher chances of dying, the effect size is about two percentage points.

Causal mechanism between apostolic faith and child mortality

While results so far suggest that apostolic faith group are more likely to experience child death, they do not say anything on the causal linkage between apostolic faith and child mortality. Ha *et al.*[21] provides evidence that apostolic faith families are less likely to take up prenatal and maternal health services even when they are largely free of charge. Unfortunately, we cannot directly establish associational pathways from the lack of utilization of maternal and child health services by the apostolic faith and the heightened risk of child death because the MIMS Survey 2009 only asked the health utilization questions for children who are born two years before the survey and were still alive. Here we exploit information gathered on the healthcare seeking behaviour of household members when they had an illness or injury in the past 2 weeks in the MIMS 2009 Survey. Table 4 shows that mothers from apostolic households have a higher chance of visiting spiritual and faith healers or traditional practitioners for advice or treatment compared to mothers from other religious groups. We further explored a subsample (3200) of women who gave birth within two years of the Survey who were asked questions on person seen for antenatal care. Table 5 shows that women from the apostolic faith are more likely to see a traditional birth attendant or a friend than they are likely to see a doctor, nurse or midwife. This provides indirect evidence that the association between apostolic faith and under five mortality could go through the channel of healthcare seeking.

Discussion and Conclusions

Employing the household survey data from MIMS 2009 and following the established conceptual framework on child mortality,[22] we find that membership of the Apostolic faith in Zimbabwe was associated with significantly higher odds of under-five mortality. This association remained valid even after adequately controlling for other mediating factors using multivariate logit regressions. We also report that mothers from apostolic households have a higher chance of visiting spiritual and faith healers or traditional practitioners for advice or treatment compared to mothers from other religious groups when they fall ill. These findings build on Ha *et al.*[23] which shows that an affiliation with the Apostolic faith is a substantial and significant risk factor in reducing the utilization of both maternal and child health services. Together they lend strong support to the *particularized theology hypothesis* and suggest that the Apostolic community, which accounts for more than one quarter of the population, is an important constituency if Zimbabwe were to reverse its decline in child health outcomes. To our best knowledge, this is the first paper showing the effects of religion on health outcomes using nationally representative data and sound empirical method in the context of Sub-Saharan Africa (SSA). These findings break new grounds in the literature as existing studies examining relationships between religion and health outcome largely substantiate the selectivity hypothesis.[24,25]

There are a couple of caveats in understanding these interesting findings. The results reported in this study are associational rather than causal because we only have cross-section data and no plausible experimental or quasi-experimental research design is used. We do observe self-selection into the Apostolic faith. Table 3 shows the pair-wise correlation of selected independent variables and covariates used in this paper. Household heads holding the Apostolic faith tended to be associated with

Table 4. Where mother went for advice or treatment.

Household head religion	Spiritual/traditional health provider services sought (%)	Chi^2(3)
Other Christians	3.23	87.38*
Apostolic sect	33.69	
Traditional	11.11	
Other and no religion	15.71	
Total	17.84	

*Significant at 1%.

Table 5. Person seen for ANC among women who gave birth within two years of the survey.

Person seen	Apostolic Religion	Other Christian	Traditional religion	Other and no religion	Total
Friend (%)	58.94	25.35	1.93	13.79	100
Untrained traditional birth attendant (%)	45.70	38.33	3.75	12.22	100
Trained traditional birth attendant (%)	74.90	19.52	1.82	3.77	100
Doctor (%)	22.71	55.56	7.66	14.07	100
Nurse/midwife (%)	30.81	39.29	9.04	20.98	100

a disadvantageous socio-economic background. They were poorer, less well educated, more likely to reside in rural areas and had a higher dependency ratio than the other Christians. Yet the effects of the Apostolic faith on under-five mortality were only reduced slightly after controlling for these observed self-selection. Self-selection (on observables at least) does not explain away the higher mortality among apostolic children. Second, the Apostolic faith does not comprise one homogenous group as captured by the Zimbabwe MIMS survey data. Maguranyanga (2011)[26] points to at least three groups: the ultraconservative, the semi-conservative and the liberal Apostolic groups which place varying emphasis on faith healing and the strict adherence to church beliefs against the use of modern medicine. In addition, our results may be interpreted as presenting the average situation for the Apostolic faith.

Further studies should use other rounds of Demographic and Health Surveys and MICS 2014 survey to examine whether this relationship between apostolic faith and higher child mortality remain robust over time. The MIMS 2009 was conducted right after the peak of the economic and political crisis. Therefore the relationship may not hold before the crisis or after the recovery. This could also enable us to have a better grasp of the causal relationship between apostolic faith and child mortality because Under-5 mortality rate seems to be stabilizing and even decline post-recovery while membership in apostolic groups continues to grow in Zimbabwe. If Under-5 mortality rate is going down disproportionately in non-apostolic groups, we can be more certain that apostolic faith has an independent and direct effect on child mortality.

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