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Religion and Mortality in sub-Saharan Africa

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Abstract: The impact of socioeconomic factors on adult and under-five mortality is a subject which has been widely discussed. However, one cannot say the same when it comes to the impact of religion on mortality, and in fact, most of the existing literature has focused on the impact of religious participation on disease-specific mortality among adults. The purpose of this paper was to examine the impact of religion both on under-five mortality and on its subdivisions namely the infant and child one. The rationale behind this choice was the fact that religions all over the world tend to include several rules that can either promote or, 'condemn' the longevity of their followers. For the implementation of this analysis, a set of nine low-income countries of sub-Saharan Africa was selected and by using the information provided by the Demographic and Health Surveys Program a study sample of 59,014 women aged 15-49 was obtained. Next, five hypotheses were formulated and tested with the help of OLS, revealing several differences among religious groups. The study concluded that these differences can be explained both by differences in religious practices and by socioeconomic ones.

Key words: Infant mortality, Child mortality, Under-five mortality, sub-Saharan Africa, Religion

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Ithaca

As you set out for Ithaca,
hope that your journey is a long one,
full of adventure, full of discoveries.

The Laistrygonians and the Cyclops,
the angry Poseidon, do not be afraid of them,
you will never find things like that on your way,
as long as you keep your thoughts raised high,
as long as a rare sensation touches your spirit and your body.

The Laistrygonians and the Cyclops,
the angry Poseidon, you won't encounter them,
unless you bring them along inside your soul,
unless your soul sets them up in front of you.

Hope that your journey is a long one.
May there be many summer mornings,
when with what pleasure, what joy,
you come into harbors seen for the first time.

May you stop at Phoenician trading stations,
to buy fine things,
mother of pearl, coral, amber and ebony,
sensual perfumes of every kind,
as many sensual perfumes as you can.

And may you visit many Egyptian cities,
to learn and learn again from those who know.
Keep Ithaca always in your mind.
Arriving there is what you are destined for.

But, do not hurry the journey at all.
Better if it lasts for years.
So that you are old by the time you reach the island,
wealthy with all you have gained in the way,
not expecting Ithaca to make you rich.

Ithaca gave you the marvelous journey.
Without her, you would not have set out.

She has nothing left to give you now.

And if you find her poor, Ithaca won't have fooled you.
Wise as you will have become, so full of experience,
you will have understood by then, what these Ithacas mean.

So, as I am approaching to my own 'Ithaca', I would like to thank each and every professor of this University that during these two years made my journey a marvelous and a full-of-experiences one.

Section 1: Introduction

1.1 Aim and Scope

It is well known that life expectancy at birth is widely used for the classification of countries in terms of their quality of life (Bartkowski et al., 2011). For instance, several indexes, such as the Human Development Index do exactly this thing (UNDP, no year), and these rankings serve as a reference for various organizations (for instance WHO, UNICEF etc.) for the implementation of certain health policies.

However, there is an irrefutable link between life expectancy at birth and age-specific mortality rates and it has been argued that throughout history, the concentration of deaths in younger ages had a considerable impact on life expectancy (Weeks, 2008, pp. 148-152).

Therefore, the reduction of under-five mortality has been, and continues to be a major challenge for organizations dealing with international public health (Lopez, 2000) and in fact, the reduction of child mortality can be encountered as a crucial objective of the UN Millennium Development Goals (United Nations, 2015; World Bank, 2015; UNICEF, 2015).

More specifically, when it comes to infant and child mortality it has been argued that until the mid-1980s approximately 15 million children died every year and they all died before reaching their fifth birthday (Lopez, 2000). In addition, Lopez (2000) argued that these deaths, especially in developing countries, could be prevented with the use of the existing technology and he supported his point of view, by citing as a counterexample the reduced infant and child mortality in the developed world.

Based on the above, it is not strange that child mortality and especially, its causes have been widely studied by many scholars. More specifically, the relationship between mortality and biomedical or socioeconomic factors has been a key research topic for many scholars dealing with Demography, or, other sciences (see for example: Amouzou & Hill, 2004; Preston, 1975; Hill et al., 2001), while, others, such as Mosley and Chen (1984), combined these factors together in an attempt to create a theoretical framework in order to explain which factors determine infant and child survival.

Apart from the socioeconomic and biomedical factors, however, the association between religion and mortality has at times attracted the interest of scholars, such as Blanchard et al. (2007), Dwyer et al. (1990) and Jarvis & Northcott (1987).

This association was studied because it is believed that religions throughout the world may include several practices, or, encourage certain behaviors that can either increase or, reduce the life span of their followers (Jarvis & Northcott, 1987).

I am also interested in this association, and in particular I wish to examine the impact of religion on infant, child and under-five mortality in a sample of developing countries in 2008. In order to do so, I will focus on nine low-income countries situated in the region of the world with the highest child mortality rates, namely sub-Saharan Africa (World Bank, 2015a; Cau et al., 2013),and I will use individual level data provided by DHS surveys (DHS, 2015).

More specifically, the selected countries are: Benin, Burkina Faso, Ethiopia, Kenya, Madagascar, Malawi, Rwanda, Sierra Leone and Zimbabwe; while my population of interest will be women aged 15-49.

Hence, in this study I will examine the proportion of dead children, infants and, dead children under-five a woman had, as well as the impact of religion on this proportion in an attempt to answer the question: *Does religion affect child and infant survival?*

Having as a starting point this general question several reasonable questions emerge as well. First, what is the role of religiosity on under-five survival? Is it possible to detect differentials in under-five mortality among religious and non-religious individuals? Second, are there differences in mortality in terms of religious affiliation? In other words, how do certain religions or, religious denominations affect under-five survival? Lastly, research has shown that the nine countries under question are composed of various religious groups that differ in terms of their size and influence (CIA, 2014a, b, c, d, e, f, g, h, i). Hence, some countries in my study are predominantly Christian (for instance, Ethiopia), while others are mainly Muslim (for instance, Burkina Faso) (CIA, 2014a, b, c, d, e, f, g, h, i). Is it possible, therefore, to find differences among countries concerning the effect of religion on under-five mortality? Can the effect of certain religions on mortality be different in countries where these religions are widespread, or, where they constitute a minority? Finally, previous research (see Heaton, 2013) has discussed differences in socioeconomic status among various religious groups. Is it possible to find something similar in the nine countries under question?

This study will try to answer all these questions in an attempt to identify to what extent several religious beliefs affect mortality. By doing so, this study is likely to give new insights concerning the determinants of under-five mortality in developing countries with a substantial within country variation in terms of religion.

1.2 Outline

This paper consists of seven sections and an Appendix. Until now, the research question has been formulated in subsection 1.1 while section 2 will present the background of the selected countries by focusing on some of their main geographic, economic and demographic characteristics. This will be done in the first part of section 2, while the later part of this section will present some of the problems that these countries encounter, including among others their inequalities, the occurrence of diseases and their high mortality rates.

Next, section 3 will deal with the theory on which I based my study as well as the hypotheses that will be examined in my analysis. More specifically, the theoretical framework of my study will be presented in subsection 3.1, while subsection 3.2 will focus on the review of the previous research. Finally, the hypotheses that will be examined in my analysis, as well as my expectations will be presented in the last subsection of this chapter.

The fourth section of this paper will give some information concerning the data used in my study, as well as their possible quality problems, while section 5 will be used for the presentation of the methodology and models used in my study.

Next, the presentation of my study results and some discussion on these results will take place in section 6, while section 7 will conclude by presenting some 'paths' for future research.

Finally, an Appendix section was added at the end of this paper. In this section important information concerning my study will be presented in order to make the reader familiar with the information presented in the main body of this paper.

Section 2: Background

2.1 Geographic, Economic and Demographic Background of the Selected Countries

In this section some characteristics of the selected countries will be presented. Thus table 1 will present some geographic and population characteristics, while some economic and demographic ones are presented in tables 2 and 3.

Table 1. Geographic and population characteristics of the selected countries.

Country	Geographic Location	Population[1]	Population in Urban areas (%)[2]	Population Growth Rate (%)[1]	Population under 25 years old (%)[1]
Benin	West Africa	10,160,000	44.90	2.80	63.90
Burkina Faso	West Africa	18,360,000	26.50	3.00	65.50
Ethiopia	East Africa	96,630,000	17.00	2.80	64.10
Kenya	East Africa	45,000,000	24.00	2.10	60.80
Madagascar	South Africa	23,200,000	32.60	2.60	61.30
Malawi	South Africa	17,370,000	15.70	3.30	67.10
Rwanda	Central Africa	12,330,000	19.10	2.60	61.00
Sierra Leone	West Africa	5,740,000	39.20	2.30	60.70
Zimbabwe	South Africa	13,770,000	38.60	4.30	60.50

Notes: 1. = 2014 est.
2. = 2011 est.
Source: Based on CIA. The World Factbook. 2014a, b, c, d, e, f, g, h, i

By observing table 1 it can be easily seen that the countries under question differ in terms of their geographic location, their population and their level of urbanization.

More specifically, the selected countries are located in the West (Benin, Burkina Faso and Sierra Leone), the East (Ethiopia and Kenya), the Central (Rwanda) and the South Africa (Madagascar, Malawi and Zimbabwe), while, their population varies greatly from a little less than six million in Sierra Leone to approximately 96,700,000 in Ethiopia. Finally, in terms of urbanization table 1 presents a mixed picture with all countries remaining predominantly rural but with great variations in terms of the proportion of their urban population.

Apart from these differences, however, table 1 presents similarities in terms of each country's population growth rate and age structure. In fact, all countries under question exhibit a population growth rate of more than two percent with Zimbabwe being the fastest growing, according to a 2014 estimate (CIA, 2014i), while they all can be characterized as 'young' countries in terms of their age structure as in all cases more than 60% of their population were found to be less than 25 years old.

Apart from the characteristics presented in table 1, it has to be mentioned that all countries, with the exception of Ethiopia, that has never been colonized, are former European colonies who gained their independence mainly in the 1960s, with the only exception being Zimbabwe who gained its independence from the United Kingdom in April 18th, 1980 (CIA, 2014a, b, c, d, e, f, g, h, i). In addition, all countries went through various political eras with their governments being, among others military, communist and democratic ones, while they all are characterized by a great variety of ethnic and religious groups (CIA, 2014a, b, c, d, e, f, g, h, i).

In terms of the demographic characteristics presented in tables 2 and 3 it can be easily seen that the life expectancy at birth in the selected countries ranges between approximately 55 and 65 years, with Madagascar having the highest life expectancy and Burkina Faso having the lowest.

Table 2. Demographic characteristics of the selected countries.

Country	**Life expectancy at birth (e_0)[1]**			**Death Rate (per 1,000)[1]**	**Infant Mortality Rate (per 1,000)[1]**		
	Total	**Male**	**Female**		**Total**	**Male**	**Female**
Benin	61.00	59.70	52.40	8.30	57.00	60.20	53.70
Burkina Faso	54.70	52.70	56.80	11.90	76.80	84.10	69.20
Ethiopia	60.70	58.40	63.10	8.50	55.70	63.70	47.50
Kenya	63.50	62.00	65.00	7.00	40.70	45.30	35.90
Madagascar	65.20	63.70	66.60	6.90	44.80	48.60	40.70
Malawi	59.90	58.00	61.90	8.70	48.00	54.90	40.90
Rwanda	59.20	57.70	60.80	9.10	59.50	63.10	55.90
Sierra Leone	57.30	54.80	60.00	11.00	73.20	81.80	64.40
Zimbabwe	55.60	55.40	55.90	10.60	26.50	28.80	24.10

Notes: 1. = 2014 est.
Source: Based on CIA. The World Factbook. 2014a, b, c, d, e, f, g, h, i

Table 2 also presents the life expectancy at birth separately for males and females and it can be easily seen that the countries under question follow in general a similar pattern where females have a higher life expectancy at birth than males. The only exception in table 2 is Benin where males had an estimated life expectancy at birth of approximately 60 years compared to almost 53 years for the females.

In addition, the selected countries experience death rates that are below 12 per 1,000 with Burkina Faso and Sierra Leone having the highest rates and Madagascar and Kenya having the lowest.

Finally, table 2 reveals that the countries under question have a total infant mortality rate, which varies between approximately 27 and 77 per 1,000. Again Burkina Faso and Sierra Leone seem to come first in fatality, while Zimbabwe has the lowest infant mortality rate. In terms of mortality patterns, female infants seem to be the 'winners' of this situation as they exhibit lower mortality rates than male infants in all countries under question.

As an epilogue to the 'mortality chapter', table 3 reveals that maternal mortality remains at substantially high levels in all countries under question with Sierra Leone 'scoring' almost 900 deaths per 100,000 live births and Madagascar having a maternal mortality rate of 240 per 100,000 live births.

Table 3. Demographic and economic characteristics of the selected countries.

Country	Birth Rate (per 1,000)[1]	Total Fertility Rate (children per woman)[1]	Maternal Mortality Rate (per 100,000)[2]	GDP real growth rate (%)[3]
Benin	36.50	5.00	350	5.00
Burkina Faso	42.40	5.90	300	6.50
Ethiopia	37.60	5.20	350	7.00
Kenya	28.20	3.50	360	5.10
Madagascar	33.10	4.20	240	2.60
Malawi	41.80	5.60	460	5.00
Rwanda	34.60	4.60	340	7.50
Sierra Leone	37.40	4.80	890	13.30
Zimbabwe	32.40	3.50	570	3.20

Notes: 1. = 2014 est.
2. = 2010
3. = 2013 est.
Source: Based on CIA. The World Factbook. 2014a, b, c, d, e, f, g, h, i

Moving on to the fertility discussion of the selected countries, table 3 reveals high birth rates with Burkina Faso and Malawi having the highest ones and Kenya

having the lowest at approximately 28 births per 1,000, while the total fertility rate remains very high in all the selected countries with Burkina Faso approaching the number of six children per woman and Kenya and Zimbabwe still having a total fertility rate of 3.5 children per woman.

In terms of their economy, finally, it has to be mentioned that all countries depend mainly on subsistence agriculture, while they also depend on several small-scale industries including, among others, textiles, cotton and tobacco (CIA, 2014a, b, c, d, e, f, g, h, i). Lastly table 3 revealed that, when it comes to economic growth, all countries experience very high growth rates with Sierra Leone having an astonishing GDP growth rate of approximately 13%, while the 'slowest' growing country, Madagascar, has a growth rate of a little more than 2.50%

2.2 'Struggles' of the selected countries

Tables 1-3 in the previous subsection presented some economic and demographic characteristics of the countries under question. Briefly, the nine countries used in this study, experience rapid population and economic growth, however, they also struggle with the well-known problems that nearly every developing country has to deal with. Therefore, the previous subsection revealed, among other things, high infant and maternal mortality rates, with the former being closely connected to a relatively low life expectancy at birth for both sexes. Unfortunately, these are not the only problems that these nine countries have to deal with. As it will be seen in this subsection, poor sanitation, inadequate health systems, inequality and a wide range of infectious diseases are only some of the characteristics that shape the sad reality in these countries in the 21st century.

Starting with table 4 it can be easily seen that the word 'inadequate' is probably the most lenient designation of the health system in the nine countries under question.

Table 4. Struggles of the countries under question – health system and water supply.

Country	**Physicians per 1,000 population[1]**	**Hospital beds per 1,000 population[2]**	**Improved drinking water source (%)[3]**		
			Total	**Urban**	**Rural**
Benin	0.06	0.50	76.10	84.50	69.10
Burkina Faso	0.05	0.40	81.70	97.50	75.80
Ethiopia	0.03	6.30	51.50	96.80	42.10
Kenya	0.18	1.40	61.70	82.30	55.10
Madagascar	0.16	0.20	49.60	78.20	35.40
Malawi	0.02	1.30	85.00	94.60	83.20
Rwanda	0.06	1.60	70.70	80.70	68.30
Sierra Leone	0.02	0.40	60.10	87.10	42.40
Zimbabwe	0.06	1.70	79.90	97.30	68.70

Notes: 1. = Physicians density data for Madagascar in 2007, Benin and Malawi in 2008, Ethiopia and Zimbabwe in 2009, Burkina Faso, Rwanda and Sierra Leone in 2010, Kenya in 2011.

2.= Hospital bed density data for Sierra Leone in 2006, Rwanda in 2007, Benin, Burkina Faso, Kenya and Madagascar in 2010, Ethiopia, Malawi and Zimbabwe in 2011.

3. = 2012 est.

Source: Based on CIA. The World Factbook. 2014a, b, c, d, e, f, g, h, i

Physicians are a scarcity with their density ranging from 0.02 per 1,000 in Sierra Leone and Malawi and 0.18 per 1,000 in Kenya, while hospital beds are also inexistent with all countries except Ethiopia having less than two hospital beds per 1,000 inhabitants.

In terms of improved drinking water sources, on the other hand, table 4 reveals a mixed picture with 85% of Malawi's total population having access to an improved drinking water source, while the same percentage for Madagascar is only 49.60%.

Apart from the insufficient water supply, however, table 4 reveals something even more important, namely the great regional inequalities in terms of water supply. So, it can be easily seen that in every country presented in table 4 the urban population has a larger access to improved drinking water sources than their rural counterparts.

In addition, in terms of access to improved sanitation facilities, the situation is even worse, but the same urban-rural inequality still exists with the only exception being Rwanda. Hence, according to table 5 in all countries under question, with the exception of Rwanda (63.80%), less than 40% of the total population has access to improved sanitation facilities and in some cases such as Benin, Madagascar, Malawi and Sierra Leone this percentage is even less than 15%.

Table 5. Struggles of the countries under question – Sanitation facilities, literacy and insufficient weight.

Country	**Improved sanitation facility access (%)[1]**			**Children under 5y.o underweight (%)[2]**	**Literacy (%)[3,4]**		
	Total	**Urban**	**Rural**		**Total**	**Male**	**Female**
Benin	14.30	25.30	5.10	20.20	42.40	55.20	30.30
Burkina Faso	18.60	50.40	6.70	26.20	28.70	36.70	21.60
Ethiopia	23.60	27.40	22.80	29.20	39.00	49.10	28.90
Kenya	29.60	31.30	29.10	16.40	87.40	90.60	84.20
Madagascar	13.90	19.20	11.30	36.80	64.50	67.40	61.60
Malawi	10.30	22.30	8.00	13.80	74.80	81.10	68.50
Rwanda	63.80	61.00	64.40	11.70	71.10	74.80	67.50
Sierra Leone	13.00	22.50	6.80	18.60	43.30	54.70	32.60
Zimbabwe	39.90	51.60	32.40	10.10	83.60	87.80	80.10

Notes: 1. = 2012 est.

2.= Children under five years old underweight data for Madagascar in 2004, Benin in 2006, Kenya in 2009, Burkina Faso, Malawi and Sierra Leone in 2010, Ethiopia, Rwanda and Zimbabwe in 2011.

3. = According to CIA (2014a, b, c, d, e, f, g) website, literacy is defined as "age 15 and over can read and write". The only exceptions are the case of Sierra Leone with a definition for literacy "age 15 and over can read and write English, Mende, Temne, or Arabic" (CIA, 2014h) and the case of Zimbabwe with a definition for literacy "age 15 and over can read and write English" (CIA, 2014i).

4.= Literacy data for Burkina Faso and Ethiopia from 2007 est., Madagascar from 2009 est., Kenya, Malawi and Rwanda from 2010 est., Benin from 2010 census, Sierra Leone and Zimbabwe from 2011 est.
Source: Based on CIA. The World Factbook. 2014a, b, c, d, e, f, g, h, i

Malnutrition is another major problem in developing countries, and the nine countries included in this study are no exception. Hence, according to table 5 the percentage of children under the age of five that are underweight ranges from approximately 10% in Zimbabwe to almost 37% in Madagascar.

Finally, table 5 presents a mixed picture in terms of literacy with the majority of countries under question having more than 50% of their population literate. From these countries, Kenya (87.40%) and Zimbabwe (83.60%) present the highest literacy, while Madagascar comes last with a percentage of 64.50%.

Four of the selected countries, however, remain predominantly illiterate with Burkina Faso having a literacy rate of less than 30% and Sierra Leone having a little more than 43% of its population literate.

Again, it terms of literacy, inequalities prevail and in this case we refer to gender ones. Thus, table 5 reveals that in every country under question females are less favored than males in terms of their ability to read and write.

However, the problems of these nine countries do not stop at this point. Poverty and income inequality are a commonplace as shown in table 6 with some countries having more than 50% of their population below the poverty line.

Table 6. Struggles of the countries under question – Poverty, inequality and HIV/AIDS.

Country	Population below poverty line (%)[1]	Household income, or, consumption by percentage share[2]		Distribution of family income- Gini Index (%)[3,4]	Number of people living with HIV/AIDS[5]
		Lowest 10%	Highest 10%		
Benin	37.40	3.10	29.00	36.50	70,000
Burkina Faso	46.70	2.90	32.20	39.50	110,000
Ethiopia	39.00	4.10	25.60	33.00	750,000
Kenya	43.40	1.80	37.80	42.50	1.600,000
Madagascar	50.00	2.20	34.70	47.50	58,000
Malawi	53.00	3.00	31.90	39.00	1,100,000
Rwanda	44.90	2.10	43.20	46.80	206,000
Sierra Leone	70.20	2.60	33.60	62.90	57,000
Zimbabwe	68.00	2.00	40.40	50.10	1,360,000

Notes: 1. = Population below poverty line (%): data for Madagascar from 2004 est., Malawi, Sierra Leone and Zimbabwe from 2004, Benin from 2007 est., Burkina Faso from 2009 est., Rwanda from 2011 est., Ethiopia and Kenya from 2012 est.

2.= Household income, or, consumption by percentage share: data for Zimbabwe from 1995, Benin and Sierra Leone from 2003, Malawi from 2004, Ethiopia and Kenya from 2005, Burkina Faso from 2009 est., Madagascar from 2010 est., Rwanda from 2011 est.

3.= Distribution of family income- Gini Index: data for Sierra Leone from 1989, Rwanda from 2000, Madagascar from 2001, Benin from 2003, Malawi from 2004, Zimbabwe from 2006, Burkina Faso from 2007, Kenya from 2008 est., Ethiopia from 2011.

4. = A Gini Index of zero (0) means perfect equality and a Gini Index of 100 means perfect inequality.

5. = 2012 est.

Source: Based on CIA. The World Factbook. 2014a, b, c, d, e, f, g, h, i

In addition, there is a considerable gap in income between the poorest and the richest elements of the population, while according to the Gini Index presented in table 6 income inequalities prevail especially in Sierra Leone.

Finally, disease is another sad reality in all countries under question. HIV/AIDS is a common problem in sub-Saharan Africa and, according to table 6; it torments thousands and sometimes millions of people in the nine countries selected for my study.

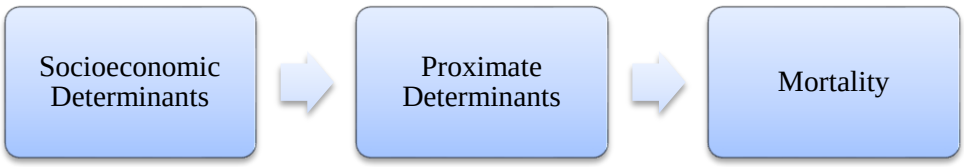
Apart from HIV/AIDS, however, the selected countries have to cope with a wide range of infectious diseases, the most common of which are food- and waterborne ones, vector-borne, respiratory and animal contact diseases (CIA, 2014a, b, c, d, e, f, g, h, i).

Section 3: Theory

3.1 Theoretical Framework

When examining mortality it is crucial to keep in mind that a child's life can be threatened both directly and indirectly by a wide range of factors (Mosley & Chen, 1984). These factors could either be biomedical, environmental, or, socioeconomic and Mosley and Chen (1984) categorized them into what is known as the proximate and socioeconomic determinants of survival. This categorization, as presented in figure 1, will serve as the main theoretical framework of my study.

Figure 1. Determinants of infant and child mortality.



Source: Based on Mosley and Chen (1984)

By observing figure 1it is possible to see that according to Mosley and Chen (1984) the proximate determinants are the ones that have a direct impact on mortality, while the socioeconomic ones act indirectly, through the proximate determinants.

Starting with the proximate determinants, Mosley and Chen (1984) identified five categories:

- Maternal factors
- Environmental Contamination
- Nutrient Deficiency
- Injury
- Personal Illness Control

These categories include a wide range of factors such as the mother's age, the parity, the air, water or food contamination, the child's calorie intake, the occurrence of accidental or intentional injury and several personal preventive measures such as the use of bed nets or vaccination (Mosley & Chen, 1984).

In terms of the socioeconomic determinants, on the other hand, Mosley and Chen (1984) distinguished between the individual, the household and the community-level variables. These variables include, among others, the household's wealth, the parents' educational level, as well as several traditions, norms and attitudes that are believed to play an important role in an infant's or a child's survival (Mosley & Chen, 1984).

The rationale behind the connection between the socioeconomic and the proximate determinants is quite simple. By considering as an example the socioeconomic factor of education, it could be argued that educated parents tend to know more about, for instance, the Malaria disease and the way that it is transmitted. Therefore, these parents are more likely to buy and use mosquito bed nets in their houses. This, in turn, will protect some children from Malaria and will increase their chances of survival. This example is not the only one, similar connections can be identified among, for instance, income and nutrition, education and breastfeeding practices etc.

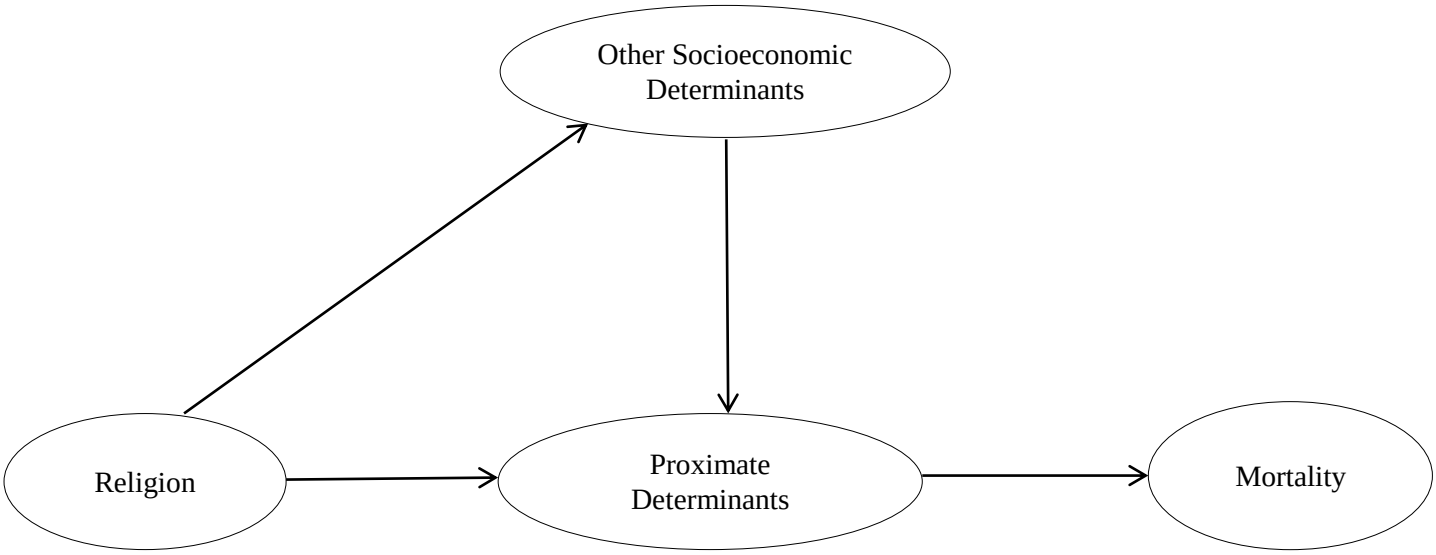
In an attempt to introduce the concept of religion in this theoretical framework, it has to be mentioned that when it comes to health and mortality, religions, all over the world tend to include several rules and activities in order to prevent morbidity and early mortality (Jarvis & Northcott, 1987). These activities and rules can either promote healthy attitudes (a balanced nutrition, regular exercise, stress reduction etc.) or prohibit unhealthy behaviors such as the use of alcohol or, tobacco (Jarvis & Northcott, 1987; Ellison et al., 2000; Strawbridge et al., 2001). The above promote health and may have a positive effect in preventing disease and death.

Religions, however, may include several attitudes that are likely to have a negative impact on an individual's health. In fact, according to Jarvis and Northcott (1987) when the situation described above is reversed, meaning that religion promotes unhealthy behaviors and prohibits the healthy ones, then this new situation may increase the risk of sickness and subsequent death. More specifically, Jarvis and Northcott (1987) argued that religions may include, among others, such attitudes as ritual suicides, religious wars and placement of the dead in rivers, increasing thus the risk of sickness and death. On the other hand, such attitudes as the rejection of modern medicine and, according to Jarvis and Northcott (1987, p. 813) "extreme asceticism", may considerably shorten a person's life span.

Summing up, from the above, it can be easily seen that religion in some cases has a positive impact on an individual's survival, while in others it may have a negative one. Moreover, it can be easily seen that religion is closely connected to several norms and attitudes, both in the individual and in the community level. Therefore, it 'falls' under the broad category of socioeconomic determinants presented in figure 1.

When it comes now to the association between religion and mortality, it could be argued that there are two ways through which religion can affect mortality and these ways are presented in figure 2.

Figure 2. The effect of religion on mortality.



Source: Author's choices based on Jarvis and Northcott (1987) and Mosley and Chen (1984)

As it can be easily seen from this figure, the effect of religion on mortality can either be mediated directly through the proximate determinants, or, it can be mediated through other socioeconomic factors, which, as already mentioned, affect in turn the proximate determinants.

Some examples where religion affects directly the proximate determinants are apparent from the discussion until now. Thus, according to Jarvis and Northcott (1987) religion can be linked to such proximate determinants as environmental contamination (placement of the dead in rivers), nutrient deficiency (extreme asceticism), injury (ritual suicides, religious wars) and personal illness control (attitudes towards modern medicine).

Religion, on the other hand, can affect the proximate determinants of survival through a range of other socioeconomic factors. An example could be the attitude of several religions towards abortion (SPUC, 2015), or, contraception. Such attitudes, in turn, could lead to uncontrolled fertility which could increase substantially the number of other children in the household. This could be associated with a more frequent occurrence of accidents, a fact that is associated with the proximate determinants of injury, while finally, it could be argued that a great number of children in the household, especially when combined with a low income could lead to malnutrition and nutrient deficiency for certain members of the household.

3.2 Previous Research

As already mentioned there is abundant literature covering the association between mortality and socioeconomic or biomedical factors (Hobcraft et al., 1984; Hobcraft et al., 1985; Jain et al., 2013). In this section, however, I will focus on the research

which deals with the association between religion and mortality and I will discuss briefly some of its main findings.

Starting with the broad category "Religious vs. Non-Religious", previous research has shown that these individuals who are religious have an advantage in terms of health compared to their non-religious counterparts (see for instance Ellison et al., 2000; Strawbridge et al., 2001; Musick et al., 2004). This advantage, according to Bartkowski et al. (2011) can be explained both by the fact that religious people are likely to 'adopt' healthier lifestyles and by the fact that they belong in a group where they can find social support.

Thus, Ellison et al. (2000) examined the association between religious involvement and mortality among African Americans and they concluded that those individuals who never attended religious services, were more likely to die compared to their more religious counterparts (Ellison et al., 2000).

In a similar extent, Strawbridge et al. (2001) examined 2,676 participants of the Alameda County Study and argued, among other things, that frequent attendance at religious services was associated both with the improvement of several 'bad habits' such as smoking and alcohol consumption and with the maintenance of several healthy behaviors. Apart from these findings, however, Strawbridge at al. (2001) also argued that frequent attendance at religious services promoted marital stability, a good mental health and was associated with an increase in the occurrence of social relationships.

Finally in a similar study concerning adults in the US, Musick et al. (2004) also found support that frequent attendance at religious services was associated with lower mortality.

Apart from this, research has shown that something similar applies also in the case of sub-Saharan Africa, where the role of religion is quite important (Cau et al., 2013). In fact, an examination of the association between religious affiliation and under-five mortality in Mozambique revealed that religious mothers had an advantage in terms of under-five survival compared to non-religious ones (Cau et al., 2013).

In addition, several scholars discussed the differences in mortality among various religious groups. In fact, Jarvis and Northcott (1987) discussed the findings of several authors who argued that Catholics and Jews exhibited lower suicide rates than Protestants both in Europe and the United States.

In the same extent, Kohler and Preston (2011) examined Bulgaria over the period 1993-1998 and argued, among other things, that suicide mortality rates were lower for Muslims than for Christians, and that young Muslim males exhibited a lower mortality rate than other non-Muslim males.

Lastly, scholars such as Jarvis and Northcott (1987) discussed differences in life expectancy among Protestants and Catholics in Mannheim, Germany, as well as differentials in cancer mortality among Jews, Catholics and Protestants.

The findings concerning suicide mortality can be explained in a great extent by the fact that some religions favor social interactions and support more than others, while the other differences in mortality can also be attributed to different health and nutrition attitudes and practices among religious groups. In fact, Bartkowski et

al. (2011) discussed the findings of a study conducted by Blanchard and his associates (2007) where the authors examined the differences in mortality between conservative Protestants, mainline Protestants and Catholics and argued that their different views and characteristics concerning the afterlife led conservative Protestants to invest less on infrastructures associated with the worldly life, namely health care (Bartkowski et al., 2011).

In addition, previous research examined the association between religion and under-five mortality and found its explanation on differences in the use of maternal and child health services (see the discussion by Cau et al., 2013, concerning Nigeria, Zimbabwe and Mexico), while other scholars discussed the socioeconomic differences among religious groups as an explanation for child mortality (see the discussion by Cau et al., 2013, concerning the case of Ghana, Brazil and Mexico).

In this extent, an example worth mentioning is that of Egypt as discussed by Saabneh (2014). In fact, the author argued that, with the exception of the last two decades of the 20th century, child mortality in Egypt was lower among Christians than among Muslims and that can be explained in a great extent by differences in their socioeconomic status (Saabneh, 2014).

Finally, the differences in socioeconomic status among religious groups have also been examined by Heaton (2013) who found both systematic and non-systematic differences. For instance, Heaton (2013) argued that Muslims and Traditionalists seemed to have a disadvantage in terms of wealth and education compared to other religious groups, while several differences have also been identified between Protestants and Catholics.

Lastly, differences in mortality among individuals of various denominations have been examined and several interesting examples can be found in the paper of Cau et al. (2013), while an example worth mentioning is that of Bartkowski et al. (2011) who examined a sample of 1,900 U.S. counties and concluded, among other things, that counties with high proportions of Pentecostal churches exhibited higher infant mortality levels when compared to counties with a higher proportion of other Protestant congregations.

3.3 Hypotheses and expectations

The discussion of the previous research revealed that several differentials in mortality have been identified among religious groups. The existing literature covers both developed and developing countries and focuses mainly on adult and disease-specific mortality. However, some research on under-five mortality has also been conducted and again several differentials have been identified. The question, however, is whether these findings can apply in the case of sub-Saharan Africa.

Even though it is not possible, or, wise to make generalizations it could be argued that previous research in general focused on three main points. First, differentials in mortality among religious groups can be explained by differences in attitudes towards modern medicine and access to health care as well as differences in practices in general. Second, such differences can be explained by the fact that religions all over the world create different social systems. These systems, in continuation can encourage the diffusion of ideas and health, sanitation or, nutrition practices or, they can provide support in times of need. Lastly,

socioeconomic factors such as education and wealth were found to explain a lot of the differences in mortality among religious groups.

It could be argued, therefore, that these three main facts can apply in the case of sub-Saharan Africa. Thus, based on these, I formulated three main hypotheses that will be examined separately for infant-, child- and under-five mortality.

These hypotheses will be the following:

- *A mother with no religion will have a higher proportion of dead infants (children aged 1-4/ children under the age of five) compared to a mother with any religion.*
- *Being a Catholic will be associated with a lower proportion of dead infants (children aged 1-4/ children under-five) than being a Protestant.*
- *A Muslim mother will have a higher proportion of dead infants (children aged 1-4/ children under the age of five) when compared to a Christian one.*

In addition, and based on the theoretical framework of my study I will examine two additional hypotheses:

- *The effect of wealth on infant (child/ under-five) mortality differs by religion.*
- *The effect of being a Christian on infant (child/ under-five) mortality differs by country.*

When it comes to my expectations and based on the above, I expect to find a pattern where having no religion will be associated with a higher proportion of dead infants; children aged 1-4 and children under the age of five. This expectation is based both on the fact that religion can create support systems that can be helpful in times of need, and on the fact that it permits the diffusion of certain ideas and attitudes that may have a beneficial effect not only on the mother's health but also on the rest family members.

In the same extent, and based on Jarvis and Northcott (1987) I expect to find differences among religious groups and in particular I expect Catholics to have an advantage in terms of survival when compared to Protestants. This expectation mainly stems from the fact that Catholics seem to follow a more 'common line' in terms of the importance of health care than Protestants as well as from the fact that they seem to have more frequent social interactions.

Finally, based on the findings by Saabneh (2014), and in combination with the fact that socioeconomic differences among religious groups have been detected (see for instance Cau et al., 2013 and Heaton, 2013) I expect that being a Muslim will be associated with a higher proportion of dead infants, children aged 1-4 and children under-five compared to being a Christian.

These exact differences in terms of the socioeconomic status encourage my expectations concerning the first additional hypothesis of my study. Therefore, I tend to believe that the effect of wealth on mortality will differ among religious groups.

Finally, and as already mentioned the countries under question are composed of various religious groups that differ in terms of size and influence (CIA, 2014a, b, c,

d, e, f, g, h, i). Thus, in my dataset it is possible to find some countries that are predominantly Christian such as Kenya or, Ethiopia and others that are predominantly Muslim such as Sierra Leone and Burkina Faso (CIA, 2014a, b, c, d, e, f, g, h, i). In addition, it is well known that mortality is highly correlated with poverty; inequality, inadequate health care and unsanitary conditions (Bartkowski et al., 2011) and the discussion in section 2 revealed that all these elements exist in different degrees in the nine countries selected for my study. Therefore, it could be argued that the effect of being a Christian will differ across these countries.

Section 4: Data

4.1 Data Sources

This analysis will be based on data provided by the Demographic and Health Surveys (DHS) program, which "… since 1984… has provided technical assistance to more than 300 surveys in over 90 countries…" (DHS, 2015a).

These surveys are conducted in households and they are nationally-representative (DHS, 2015b). For their implementation four questionnaires are used, namely a Household questionnaire, a Man's, a Woman's and a Biomarker one (DHS, 2015c).

Briefly, the Household Questionnaire is designed to gather information concerning some household characteristics, including, among others the type of toilet facilities and the source of drinking water, while it also collects information on various topics such as age, sex and education both for the usual residents and the visitors of the household (DHS, 2015c).

The Man's and Woman's Questionnaires, on the other hand, are designed to go deeper on the characteristics of the selected individuals and they gather information concerning, among other things, their education, their employment and their attitudes towards contraception and family planning (DHS, 2015c).

Finally, the Biomarker Questionnaire gathers information concerning such things as Anemia, HIV and the nutritional status of both parents and children (DHS, 2015c).

4.2 Original Sample

As already mentioned, in my study I wish to focus on nine low-income countries located in sub-Saharan Africa, and therefore, I used the respective DHS surveys, some of their main characteristics are presented in table 7.

As it can be easily seen from this table, the selected surveys contain information for more than 110,000 households, more than 130,000 females as well as for more than 60,000 males.

Another thing that can be easily seen in table 7 is the time period that each DHS survey took place. Earlier in this paper, I expressed the wish to examine the impact of religion on under-five survival in 2008. However, a first limitation that I encountered when I first examined the available DHS surveys was the fact that not all countries had surveys in the year that I am interested in.

Table 7. DHS Surveys – Characteristics.

Country	Fieldwork	Household Sample Size	Female Sample Size[1]	Male Sample Size[2]
Benin	August 2006 – November 2006	17,511	17,794	5,321
Burkina Faso	May 2010 – January 2011	14,424	17,087	7,307
Ethiopia	December 2010 – May 2011	16,702	16,515	14,110
Kenya	November 2008 – February 2009	9,057	8,444	3,465
Madagascar	November 2008 – August 2009	17,857	17,375	8,586
Malawi	June 2010 – November 2010	24,825	23,020	7,175
Rwanda	September 2010 – March 2011	12,540	13,671	6,329
Sierra Leone	April 2008 – June 2008	7,284	7,374	3,280
Zimbabwe	September 2010 – March 2011	9,756	9,171	7,480
Total		117,416	130,451	63,053

Notes: 1. = The Female Sample refers to women aged 15-49.
2. = The Male Sample refers to men aged: 15-64 in Benin, 15-59 in Burkina Faso, Ethiopia, Madagascar, Rwanda and Sierra Leone, and 15-54 in Kenya, Malawi and Zimbabwe.
Source: Based on the survey summaries provided by the DHS Program (DHS, 2015d, e, f, g, h, i, j, k, l).

In order to proceed with my analysis I chose the nearest survey available to 2008, and after an examination of each country's background, I chose to use those countries in which no significant events occurred during the survey period. By the term significant events I mainly mean those that could account for an increased mortality rate over the period of the survey, namely wars and famines.

4.3 Study Sample

By limiting my original sample, I focused on women aged 15-49 and especially those who ever had a singleton. In continuation, I restricted my sample even more to those women who ever had a singleton six to ten years before the interview of the survey took place, while finally, and as I also want to examine several household characteristics, I chose to examine only those women that were usual household residents.

These procedures that are more extensively discussed in the appendix section A.1 at the end of this paper restricted my original sample from 130,451 observations to a study sample of 59,014 observations.

4.4 Variable Choice

Before starting the presentation of the descriptive statistics, a few things have to be mentioned concerning the variables that I selected for my study. In total my dataset consists of 36 variables, three of which are the dependent ones and the rest of them are the independent ones.

In terms of the dependent variables the proportion of dead infants, the proportion of dead children and the proportion of dead children under the age of five will be examined.

Next, and according to the theoretical framework presented in section 3, I included several socioeconomic variables in my analysis that I believe they may have an impact on infant and child survival. Thus, 33 variables refer to socioeconomic factors and they were chosen in order to represent the individual-, household- and community-level, while two of them are interaction variables that will serve for the examination of my additional hypotheses.

In terms of the individual level variables, 15 independent variables were selected, five concerning the mother and father's individual productivity, and ten referring to norms, attitudes and habits.

Thus, my dataset includes such variables as the age of the mother as well as the parents' occupation and educational level. These variables were selected because I tend to believe that there is a connection between them and child mortality in the sense that more educated parents may be able to raise healthier children. In the same extent, a parent's occupation is closely connected with the household's income, a factor that may also influence a child's survival. In addition, I terms of the traditions, norms and values my dataset includes, apart from the religion variables, such variables as the justification of domestic violence, the total number of children ever born, the marital status of the individual, its opinion importance and whether the individual is a smoker or not.

Continuing with the household level variables, I chose to include 15 covariates in my analysis. These covariates can be further divided as follows:

One variable will be examined concerning the household's wealth, while two others were chosen because they refer to the household head and in particular its age and its sex.

When it comes to the household wealth in particular, the theoretical framework presented in section 3 showed that it is a factor that can influence indirectly a child's survival. Therefore, I expect to find a pattern where children born in richer households tend to have higher chances of survival.

In addition, a range of variables will be used in order to examine the general condition of the house. These, include four variables concerning the existence of several household appliances such as refrigerator, radio, television and telephone, while three others were chosen in order to assess the building's general condition by referring to the materials used for the roof, walls and floor of the house.

The rationale behind their choice is simple, the better a house is, the more protected the child will be, and thus the higher its chances of survival.

Moreover, three variables will be used concerning the type of toilet facilities, as well as the source of drinking water and the time that it takes to get to the water source, while lastly; two variables were selected concerning the number of household members.

Finally, in terms of the community level variables, one covariate was selected in order to represent the country in which each individual resides.

4.5 Descriptive Statistics

In this subsection some of the main characteristics of the variables used in my study will be presented. Table 8 will present some summary statistics for the continuous variables in my dataset, while table 9 will present a more detailed picture of the categorical variables by presenting some descriptive statistics[1]. Due to its large size, however, table 9 was placed in the appendix section A.2 at the end of this paper.

Starting with some summary statistics, and in terms of my dependent variables it can be easily seen from table 8 that based on 59,014 observations the mean proportion of dead infants in my dataset was found to be 0.0648, while the mean proportion of dead children aged 1-4 and dead children under the age of five was 0.0439 and 0.1119 respectively. Finally, and since we talk about proportions my variables ranged between zero and one.

Table 8. Summary Statistics.

Variable	Obs	Mean	Standard Deviation	Minimum Value	Maximum Value
Dependent Variables					
Proportion of dead infants	59,014	0.0648	0.2057	0	1
Proportion of dead children	59,014	0.0439	0.1718	0	1
Proportion of dead under-five	59,014	0.1119	0.2664	0	1
Independent Variables					
Total number of children ever born	59,014	4.8875	2.3424	1	18
Total number of children ever born²	59,014	29.3740	27.8771	1	324
Number of household members	59,014	6.6228	3.0994	1	49
Number of household members²	59,014	53.4679	66.6529	1	2,401

Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

In addition, table 8 presents four independent variables, namely the total number of children ever born and its square, and the number of household members and its square. Again, based on 59,014 observations the mean total number of children ever born was found to be 4.8875 children with a minimum value of one and a maximum of 18.

[1] The purpose of these tables is to make the reader familiar with the data used in this study by giving him a general picture of them. However, more detailed information concerning the selected variables can be found in the appendix section A.3 at the end of this paper.

Moreover, and since it could be argued that the relationship between the total number of children ever born and under-five mortality is not a linear one, I also chose to include in my analysis the square of this variable. This had according to table 8 a mean of 29.3740 children with a minimum value of one and a maximum value of 324.

Finally, the number of household members was also included in my analysis and table 8 reveals that there were on average 6.6228 members in the household, while the variable ranged between one and 49 members.

Again, as in the case of the total number of children ever born, I tend to believe that the relationship between the number of household members and infant-, child- or, under-five mortality is not a linear one and therefore I also chose to include the square of this variable in my analysis, which has a mean of 53.4679 and ranges between one and 2,401.

Moving on with the presentation of the selected variables, table 9 in the appendix presents some descriptive statistics for the categorical variables that were selected for my analysis.

In terms of the individual level variables, table 9 revealed that the majority of the women in my dataset had no education. In fact, the percentage of these women was found to be 48.56%, while, something similar was found for the husband's educational level (38.93%).

In addition, in terms of age, 42.82% of the women in my dataset were above the age of 35, while, in terms of occupation the majority of the women under question was blue collar workers and approximately 20% of them had no occupation. Similarly, approximately 76% of the individuals in my dataset had a husband or, a partner who was a blue collar worker, while 20.53% of them had a partner who was either a white or, a pink collar worker.

In terms of traditions, norms and attitudes a little more than 80% of the women in my dataset were married at the time of the survey, while when it comes to the justification of wife beating, approximately 55% of these women replied that it is not justified and 44.09% of them had an opposite opinion. Moreover, the majority of the individuals in my dataset were non-smokers (94.26%), while in terms of their opinion importance 32.67% were found to have an opinion that had some value, while this was not the case for 39.81% of them.

Finally, in terms of religion 25.70% of the women in my dataset were Muslim, an approximately 62% were Christian, almost 10% had no religion (5.07%) or, believed in traditional religions (5.26%), while 1.34% had other religious beliefs.

In the case of Christians, in particular, *Religion2* in table 9 revealed that approximately 20% were Catholics, 25.93% were Protestants and 16.41% of them belonged to other Christian groups (for instance, Orthodox Christians).

Moving on with the household level variables, 43.09% of the women in my dataset belonged either in the poorest or, the poorer quintile of the population in terms of wealth, while the majority of them had no household appliances such as television (84.96%), refrigerator (95.74%) or, landline telephone (97.81%). The existence of radio was the only exception in terms of household appliances, with 60.89% of the individuals under question answering that they had one in their house.

Moreover, the majority of the women in my dataset had access to an improved drinking source (65.70%) while the majority of them had a non-improved toilet facility (85.41%). In terms of the needed time in order to get to the water source only a small percentage had drinking water on premises (14.08%), while 50.73% were less than 30 minutes away from the drinking source.

In terms of the house materials, the majority of the individuals in my dataset responded that their house floor was made from natural materials, while the majority argued that both their walls and their roof was made of finished materials.

Finally, in terms of the age and sex of the household head, table 9 revealed that the majority of the women in my dataset live in houses where the household head is a man (78.76%), while the majority of the household heads in my dataset are more than 40 years old (51.15%).

Lastly, in terms of the community level variables it can be argued that the majority of the individuals in my dataset lived in Malawi (19.60%), while the women who lived in Benin, Burkina Faso, Ethiopia and Madagascar accounted together for 54.36%. With lower percentages, the women from Kenya, Rwanda, Sierra Leone and Zimbabwe accounted for the rest of the population in my sample.

Finally, as an epilogue to the presentation of the selected variables, I chose to present some bivariate statistics for some variables of my choice that refer both to the main, and the additional hypotheses presented in section 3. The bivariate statistics are presented in table 10, which due to its large size was placed in the appendix section A.2 at the end of this paper.

By observing this table, and in terms of the first hypothesis, it could be argued that the bivariate analysis for *Religion3* shows that those who have no religion seem to have a lower mean proportion of dead infants, children aged 1-4 and children under the age of five than their religious counterparts.

In addition, when it comes to the second hypothesis, the bivariate analysis for *Religion2* revealed that Catholics seem to have a disadvantage in terms of survival when they are compared to Protestants. In fact their mean proportions were higher than the ones found for Protestants and this was true not only for infant mortality, but also for child and under-five mortality.

Finally, when it comes to the third hypothesis the bivariate analysis for *Religion1* revealed that when compared to Christians, Muslims seem to have a higher mean proportion of dead infants, while the same is true when it comes to children aged 1-4 and children under the age of five.

In terms of my additional hypotheses, on the other hand, the results presented in table 10 seem to agree with my expectations.

Starting with the first hypothesis, my bivariate analysis showed that the mean proportions of dead infants, children aged 1-4 and children under the age of five seemed to be different among religious groups. Thus, in terms of infant mortality, Muslims were found to have higher mean proportions than the others in the middle and richer quintile of the wealth index, while, individuals with other religious beliefs who belonged in the poorest element of the population seemed to have a disadvantage in terms of survival. When it comes to the poorer and richest element

of the population, however, Traditionalists/ Animists were found to have the highest mean proportions of dead infants.

In addition, in terms of child mortality, Muslims who belonged in the middle, poorest and poorer quintile of the wealth index were found to have the highest mean proportions of all, while individuals with traditional or, Animist beliefs who belonged in the richer and richest elements of the population seem to come first in terms of child mortality.

Finally, when it comes to under-five mortality my bivariate analysis revealed that the Muslims who belonged in the middle, poorer and richer element of the population had the highest mean proportions of dead children when compared to all other religious groups, while those with traditional or, Animist beliefs seemed to come first in mortality in the poorest and richest quintiles of the wealth index.

Lastly, when it comes to my last hypothesis, several differences among countries have been detected. In fact, Christians who lived in Sierra Leone were found to have the highest mean proportion of all, both when it comes to infant, and under-five mortality, while Christians in Benin seemed to come first in terms of child mortality.

From the above it can be easily seen that the bivariate analysis seems to agree with some of my expectations, however, this analysis was conducted in order to get a general picture of what seems to be the case in my dataset. No conclusions can be reached, however, until the multivariate analysis is conducted.

4.6 Data Problems and Limitations

In December 1990, the Institute for Resource Development published a report called *"An Assessment of DHS-I Data Quality"*. In this report several problems in terms of data quality were examined and discussed, and they included, among others, the misreporting of the birth year of both parent and child, as well as the mother's age at first birth (Institute for Resource Development, 1990). In addition, according to the same report several cases have been identified where the individuals under question had misreported the exact number of dead children or, the year of their death, while finally, in some cases the children that they were not living in the household have been forgotten and they had not been reported (Institute for Resource Development, 1990).

Even though this report refers to a previous DHS survey, the reader should keep in mind that these problems may also exist in the surveys used in this study.

Moreover, apart from the problem of misreported variables, my data set faced the problem of missing variables as well. In order to deal with this limitation I chose to include them in my analysis as a separate category (see table 9), however, the coefficients for the "Missing" categories will not be interpreted.

Section 5: Methodology

5.1 Presentation of the Models

As already mentioned, throughout my analysis I will test three basic hypotheses as well as two additional ones, separately for infants, children aged 1-4 and children under the age of five.

In this section, the presentation of the models used for infant mortality will take place, while these models will be further modified in order to account for the other categories of interest.

5.1.1 Model 1

Model 1 will be used for the testing of the first hypothesis presented earlier in section 3. As a reminder, it has to be mentioned that this hypothesis stated that: *Having no religion will be associated with a higher proportion of dead infants (children aged 1-4/children under the age of five) compared to having any religion.*

For the examination of this hypothesis, I will use OLS, in order to estimate the population regression function presented in equation (1):

$$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion3_i + \beta_3 * Country_i + u_i \quad \ldots\ldots(1)$$

This will be a basic model that will give me some information concerning the effect of religion on mortality. As already mentioned in subsection 3.1, this effect will be mediated through various proximate determinants that will not be included in my models.

Next, I will examine the effect of religion on mortality, but this time this effect will be mediated through other socioeconomic determinants.

The inclusion of the socioeconomic determinants in my analysis will result in the population regression function presented in equation (1'):

$$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion3_i + \beta_3 * Country_i + \beta_4 * Socioeconomic\ Determinants_i + u_i \quad \ldots\ldots(1')$$

In order to estimate the population regression functions presented above, I will use the information provided by my final data set and I will estimate the sample regression functions presented by the equations (1a) and (1a'):

$$Proportion\ Dead\ Infants_i = \widehat{\beta_1} + \widehat{\beta_2} * DReligion3_i + \widehat{\beta_3} * DCountry_i + \widehat{u_i} \quad \ldots\ldots(1a)$$

And,

$$Proportion\ Dead\ Infants_i = \widehat{\beta_1} + \widehat{\beta_2} * DReligion3_i + \widehat{\beta_3} * DCountry_i + \widehat{\beta_4} * Number\ of\ household\ members_i + \widehat{\beta_5} * Number\ of\ household\ members^2{}_i + \widehat{\beta_6} * Total\ number\ of\ children\ ever\ born_i + \widehat{\beta_7} * Total\ number\ of\ children\ ever\ born^2{}_i + \widehat{\beta_8} * DMarried_i + \widehat{\beta_9} * DHusband's\ Occupation_i + \widehat{\beta_{10}} * DRespondent's\ educational\ level_i + \widehat{\beta_{11}} * Dwife\ beating_i + \widehat{\beta_{12}} * DRespondent's\ occupation_i + \widehat{\beta_{13}} *$$

$DOpinion\ Importance_i + \widehat{\beta_{14}} * DRespondent's\ age_i + \widehat{\beta_{15}} * DTelevision_i + \widehat{\beta_{16}} * Drefrigerator_i + \widehat{\beta_{17}} * Dsmoking_i + \widehat{\beta_{18}} * DDrinking\ source_i + \widehat{\beta_{19}} * Dtime\ to\ water\ source_i + \widehat{\beta_{20}} * DSex\ of\ household\ head_i + \widehat{\beta_{21}} * Dfloor\ material_i + \widehat{\beta_{22}} * Dtoilet\ type_i + \widehat{\beta_{23}} * DHusband\ or, partner's\ educational\ level_i + \widehat{\beta_{24}} * Dwalls\ material_i + \widehat{\beta_{25}} * Dage\ of\ household\ head_i + \widehat{\beta_{26}} * Dwealth\ index_i + \widehat{\beta_{27}} * Dtelephone_i + \widehat{\beta_{28}} * Droof\ material_i + \widehat{\beta_{29}} * Dradio_i + \widehat{u_i}$……………………..(1a')

What has to be mentioned concerning the equations (1a) and (1a') is the fact that the letter "D" in front of the variable's name was used in order to denote that this variable is a categorical one. Moreover, according to the equations presented above, it can be easily seen that my first model will include a range of covariates and therefore I chose not to show in detail all the coefficients for each category in my sample regression function. As a note to the reader, however, it has to be mentioned that every category of my categorical variables will have its own coefficient.

5.1.2 Model 2

Model 2, on the other hand, will be used for the examination of the second hypothesis which states that: *Being a Catholic will be associated with a lower proportion of dead infants (children aged 1-4 / children under-five) than being a Protestant.*

In this case I will follow the same steps as in model 1 with the only difference being the fact that a different variable for religion will be used. Thus, I will use OLS in order to estimate the population regression functions presented in equations (2) and (2'):

$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion2_i + \beta_3 * Country_i + u_i$ ……(2)

And,

$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion2_i + \beta_3 * Country_i + \beta_4 * Socioeconomic\ Determinants_i + u_i$ ……………………………………………(2')

As in the previous model, and based on the information provided by my final dataset I will estimate two sample regression functions that will be similar with the ones presented in equations (1a) and (1a'). The only difference in this case will be the fact that *Religion3* will be replaced by *Religion2.*

5.1.3 Model 3

Model 3 will be used for the examination of the third main hypothesis which states that: *A Muslim mother will have a higher proportion of dead infants (children aged 1-4/ children under-five) when compared to a Christian one.*

Again, model 3 will be the same as before with the only difference being the fact that a new religion variable will be used. Hence, OLS will be used once again in order to estimate the population regression functions presented in equations (3) and (3'):

$$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion1_i + \beta_3 * Country_i + u_i \ldots\ldots(3)$$

And,

$$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion1_i + \beta_3 * Country_i + \beta_4 * Socioeconomic\ Determinants_i + u_i \ldots\ldots(3')$$

Once again, by using the information provided by dataset I will estimate two sample regression functions that will be similar to the ones presented in equations (1a) and (1a') with the only difference being the fact that instead of using the variable *Religion3* I will now use the variable *Religion1*.

5.1.4 Models 4 and 5

Finally, models 4 and 5 will be used for the examination of the two additional hypotheses presented in section 3.

As a reminder, it is worth mentioning that the additional hypotheses were the following:

- *The effect of wealth on infant (child/ under-five) mortality differs by religion.*
- *The effect of being a Christian on infant (child/ under-five) mortality differs by country.*

Starting with the first hypothesis, I generated the interaction variable *Religion2*Wealth Index* which can be found in table 9.

Then, and in order to proceed with the examination of this hypothesis I used the final form of model 2 (see equation (2')) as my basic model, and I added my new variable in it. This gave me the population regression function presented by equation (4):

$$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion2_i + \beta_3 * Country_i + \beta_4 * Socioeconomic\ Determinants_i + \beta_5 * Religion2 * Wealth\ Index_i + u_i \ldots\ldots(4)$$

Again, by using the information provided by my dataset and with the help of OLS I will estimate a sample regression function similar to the one presented earlier (see equation (1a')).

Finally, in order to test the second additional hypothesis, I generated a new variable called *Religion4* (see table 9). This variable helped me further for the generation of the interaction variable *Religion4*Country* some of its main characteristics can be found in table 9.

Then, by following the same procedure as before I used model 2 as my basic model. After adding my new variable in the model and replacing *Religion2* with *Religion4* I obtained the population regression function presented by equation (5):

$$Proportion\ Dead\ Infants_i = \beta_1 + \beta_2 * Religion4_i + \beta_3 * Country_i + \beta_4 * Socioeconomic\ Determinants_i + \beta_5 * Religion4 * Country_i + u_i \ldots\ldots\ldots\ldots (5)$$

Lastly, and as in the previous cases, a new sample regression function will be estimated with the help of OLS.

Section 6: Analysis

6.1 Results for Model 1

As already mentioned, model 1 was used in order to test the first main hypothesis presented in subsection 3.3. In order to proceed with my analysis I performed a set of regressions, some of their main characteristics are shown in table 11.

Table 11. Modifications of Model 1.

	Infant mortality		**Child mortality**		**Under5 mortality**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Reg1	**Reg2**	**Reg3**	**Reg4**	**Reg5**	**Reg6**
Religion3						
Any religion	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
No religion	0.0119**	-0.0006	0.0055	-0.0052	0.0163**	-0.0077
	(0.0039)	(0.0041)	(0.0031)	(0.0033)	(0.0050)	(0.0052)
Missing	-0.0329**	-0.0302**	-0.0262***	-0.0244**	-0.0604***	-0.0556***
	(0.0118)	(0.0114)	(0.0075)	(0.0076)	(0.0138)	(0.0133)
Country						
Burkina Faso	0.0263***	0.0336***	0.0444***	0.0434***	0.0718***	0.0781***
	(0.0031)	(0.0046)	(0.0027)	(0.0037)	(0.0041)	(0.0059)
Benin	0.0215***	0.0265***	0.0338***	0.0360***	0.0572***	0.0648***
	(0.0030)	(0.0044)	(0.0026)	(0.0036)	(0.0040)	(0.0056)
Ethiopia	0.0218***	0.0107*	0.0120***	0.0007	0.0330***	0.0104
	(0.0033)	(0.0050)	(0.0024)	(0.0038)	(0.0041)	(0.0062)
Kenya	0.0121**	0.0038	0.0005	-0.0007	0.0115*	0.0020
	(0.0041)	(0.0056)	(0.0027)	(0.0040)	(0.0049)	(0.0068)
Madagascar	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Malawi	0.0179***	0.0167***	0.0216***	0.0244***	0.0388***	0.0416***
	(0.0029)	(0.0041)	(0.0023)	(0.0033)	(0.0037)	(0.0052)
Rwanda	0.0190***	0.0208***	0.0190***	0.0237***	0.0380***	0.0463***
	(0.0036)	(0.0053)	(0.0028)	(0.0041)	(0.0046)	(0.0066)
Sierra Leone	0.0592***	0.0663***	0.0290***	0.0278***	0.0889***	0.0951***
	(0.0049)	(0.0058)	(0.0036)	(0.0043)	(0.0060)	(0.0071)
Zimbabwe	-0.0140***	0.0048	-0.0097***	0.0098**	-0.0244***	0.0162**
	(0.0034)	(0.0049)	(0.0024)	(0.0037)	(0.0043)	(0.0062)
Socioeconomic Determinants		**X**		**X**		**X**
Constant	0.0459***	0.0527***	0.0235***	0.0302***	0.0725***	0.0886***
	(0.0022)	(0.0087)	(0.0016)	(0.0067)	(0.0027)	(0.0112)
Number of obs.	59,014	59,014	59,014	59,014	59,014	59,014
R^2	0.0051	0.0299	0.0085	0.0240	0.0115	0.0517
F	31.2310	18.8887	60.7746	20.0444	81.3386	38.3479
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Robust standard errors in parentheses.

X denotes that the socioeconomic determinants were included in the regression.
The full table is available upon request.
* p<0.05, ** p<0.01, *** p<0.001

Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

As a starting point for the understanding of this table it has to be mentioned that columns (1), (3) and (5) present the coefficients for religion and country when no other covariates were included in the analysis. This could be characterized as a first basic model.

Next, the socioeconomic determinants were included in the basic model, and new regressions were performed. Again, I chose to show the coefficients for religion and country and these are presented in columns (2), (4) and (6).

Starting with infant mortality, the religion coefficient was found to be significant when no other variables were added in the model (see Reg1). In fact, the coefficient for non-religious indicated that a woman who lived in Madagascar and had no religion was expected to have a 1.19% increase in her proportion of dead infants when she was compared to her religious counterpart. In addition, all the country coefficients were found to be significant at a 1% level or, less, while all of them, with the exception of Zimbabwe, had a positive sign.

This situation changed, however, when the socioeconomic determinants were added in the model and in fact, the coefficient of religion became negative and insignificant. Lastly, table 11 reveals that when several socioeconomic factors were added in the analysis they also had an impact on the significance of two country coefficients, namely the ones referring to Kenya and Zimbabwe.

When it comes to child mortality, columns (3) and (4), in table 11, present a completely different picture. In this case, the coefficients for those with no religion were found to be insignificant. Thus, the proportion of dead children in the basic model is explained only by the country in which the individual resides, while later it is explained by several socioeconomic factors.

Lastly, in terms of under-five mortality table 11 revealed that when no other covariates were accounted for (see Reg5), a woman who lived in Madagascar and had no religion was expected to have a 1.63% increase in her proportion of dead children under five when she was compared to her religious counterpart. Again, in this case all the country coefficients remained significant at a 5% level or, less with Zimbabwe's being a negative one.

As in the previous cases, however, the religion coefficient became insignificant when other socioeconomic determinants were added in the model, while there was also a change in the significance of several country coefficients.

Summing up, my analysis revealed that religious individuals seem to have an advantage in terms of infant and under-five survival when they are compared to their non-religious counterparts. This is the case when we test the effect of religion on mortality when no other factors are accounted for. When several socioeconomic determinants are included in the model, however, the coefficient of religion becomes insignificant. In terms of child mortality, on the other hand, the results were somewhat different. In this case the religion coefficient was found to be insignificant, both when no other factors were accounted for and with the inclusion of the socioeconomic determinants in the model.

6.2 Results for Model 2

Model 2, in continuation, was used in order to examine the second main hypothesis. By following the same procedure as in the previous subsection I obtained the results presented in table 12.

Table 12. Modifications of Model 2.

	Infant mortality		**Child mortality**		**Under5 mortality**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Reg7	**Reg8**	**Reg9**	**Reg10**	**Reg11**	**Reg12**
Religion2						
Protestant	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Muslim	0.0080**	0.0050	0.0118***	0.0070**	0.0195***	0.0113**
	(0.0029)	(0.0030)	(0.0025)	(0.0026)	(0.0038)	(0.0039)
Catholic	-0.0038	-0.0039	-0.0039	-0.0040	-0.0086**	-0.0087**
	(0.0025)	(0.0024)	(0.0021)	(0.0020)	(0.0032)	(0.0031)
Other Christian	-0.0005	-0.0031	0.0006	-0.0014	-0.0005	-0.0052
	(0.0030)	(0.0030)	(0.0025)	(0.0025)	(0.0038)	(0.0038)
No religion	0.0126**	-0.0000	0.0055	-0.0059	0.0167**	-0.0083
	(0.0041)	(0.0043)	(0.0033)	(0.0035)	(0.0052)	(0.0054)
Traditional/ Animist	0.0176***	0.0105*	0.0038	-0.0046	0.0214***	0.0050
	(0.0047)	(0.0048)	(0.0041)	(0.0041)	(0.0061)	(0.0062)
Other	0.0010	0.0028	0.0007	0.0018	0.0001	0.0030
	(0.0068)	(0.0067)	(0.0053)	(0.0052)	(0.0088)	(0.0086)
Missing	-0.0306*	-0.0293*	-0.0239**	-0.0239**	-0.0563***	-0.0549***
	(0.0119)	(0.0115)	(0.0075)	(0.0077)	(0.0139)	(0.0135)
Country						
Madagascar	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Burkina Faso	0.0199***	0.0309***	0.0366***	0.0408***	0.0575***	0.0729***
	(0.0036)	(0.0048)	(0.0030)	(0.0039)	(0.0047)	(0.0061)
Benin	0.0161***	0.0245***	0.0300***	0.0363***	0.0479***	0.0633***
	(0.0033)	(0.0045)	(0.0028)	(0.0037)	(0.0043)	(0.0058)
Ethiopia	0.0181***	0.0099	0.0058*	-0.0016	0.0229***	0.0074
	(0.0037)	(0.0052)	(0.0028)	(0.0040)	(0.0047)	(0.0065)
Kenya	0.0108**	0.0029	-0.0021	-0.0023	0.0074	-0.0007
	(0.0041)	(0.0057)	(0.0028)	(0.0041)	(0.0050)	(0.0069)
Malawi	0.0173***	0.0173***	0.0195***	0.0236***	0.0361***	0.0414***
	(0.0032)	(0.0043)	(0.0026)	(0.0035)	(0.0041)	(0.0055)
Rwanda	0.0200***	0.0213***	0.0195***	0.0236***	0.0394***	0.0465***
	(0.0036)	(0.0053)	(0.0029)	(0.0042)	(0.0046)	(0.0066)
Sierra Leone	0.0526***	0.0636***	0.0186***	0.0227***	0.0719***	0.0873***
	(0.0054)	(0.0061)	(0.0041)	(0.0047)	(0.0067)	(0.0076)
Zimbabwe	-0.0145***	0.0039	-0.0107***	0.0088*	-0.0262***	0.0140*
	(0.0035)	(0.0050)	(0.0026)	(0.0038)	(0.0045)	(0.0063)
Socioeconomic Determinants		**X**		**X**		**X**
Constant	0.0465***	0.0521***	0.0246***	0.0305***	0.0746***	0.0889***
	(0.0025)	(0.0088)	(0.0020)	(0.0068)	(0.0033)	(0.0113)
Number of obs.	59,014	59,014	59,014	59,014	59,014	59,014
R^2	0.0056	0.0302	0.0093	0.0245	0.0127	0.0522

F	22.6096	17.7368	42.3758	18.9151	57.8440	36.1968
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Robust standard errors in parentheses.
X denotes that the socioeconomic determinants were included in the regression.
The full table is available upon request.
* p<0.05, ** p<0.01, *** p<0.001
Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

Starting, again, with infant mortality, it has to be mentioned that the basic model in table 12 revealed three significant coefficients in terms of religion, while all the country coefficients were found to be significant at a 1% level or, less. More specifically, the analysis revealed that a Muslim woman who lived in Madagascar was expected to have a 0.8% increase in her proportion of dead infants when she was compared to her Protestant counterpart. In addition, the respective increase for a non-religious woman in Madagascar was found to be 1.26%, while; a woman with traditional or, Animist beliefs was expected to have a 1.76% increase in the proportion under question when she was compared to her Protestant counterpart.

As in model 1, the second column of table 12 presents the coefficients for country and religion when the socioeconomic determinants were taken into consideration. In this case, the coefficients for Ethiopia, Kenya and Zimbabwe became insignificant, while in terms of religion, one significant coefficient was found for those with traditional or, Animist beliefs. In fact, this coefficient indicated that a woman with Animist beliefs was expected to have a 1.05% higher proportion of dead infants than her Protestant counterpart.

When it comes to child mortality, my analysis revealed that when no other covariates were included in my model, Muslims seemed to have a disadvantage in terms of survival when compared to Protestants. In fact, table 12 revealed that a Muslim mother in Madagascar was expected to have a 1.18% higher proportion of dead children aged 1-4 when she was compared to her Protestant counterpart. In addition, in terms of the country coefficients, the coefficient for Kenya was the only one that was found to be insignificant, while all the others were found to be significant at a 5% level or, less.

The exact same picture about Muslims was found when the socioeconomic determinants were added in the model. The coefficient for Muslims was found to be significant at a 1% level indicating that Muslim mothers had on average a 0.70% higher proportion of dead children than Protestants, while apart from Kenya, the coefficient for Ethiopia became insignificant as well.

Finally, the last two columns of table 12 present the analysis for under-five mortality. Starting with the basic model (see Reg11) the analysis revealed four significant coefficients in terms of religion, while the country coefficients were also found to be significant with the only exception being the coefficient for Kenya.

In fact, the analysis revealed that Protestants had an advantage in terms of survival when compared to Muslims, non-religious and Traditionalists/ Animists, while they seemed to have a disadvantage when compared to Catholics. More specifically, Muslims were expected to have a 1.95% increase in their proportion of dead children under-five when compared to their Protestant counterparts, while the percentage increases for non-religious and Traditionalists/Animists were found to be 1.67 and 2.14 % respectively. Lastly, my analysis revealed that being a

Catholic in Madagascar was associated with an expected proportion of dead children under the age of five that was 0.86% lower than the one for Protestants.

Finally, when the socioeconomic covariates were added in the model for under-five mortality, the coefficients for non-religious and Animists became insignificant and so did the coefficient for Ethiopia. The coefficients for Muslims and Catholics remained significant at a 1% level, denoting that, *ceteris paribus*, a Muslim mother was expected to have a proportion of dead children under the age of five that would be 1.13% higher than the one of a Protestant mother, while Catholics were expected to have a 0.87% lower proportion of dead children under-five when compared to their Protestant counterparts.

Summing up, the analysis of model 2 revealed that Protestants had an advantage over Muslims, non-religious and Traditionalists/Animists in terms of infant survival. This advantage was found when no other covariates were taken into consideration. The inclusion of several socioeconomic factors in the model, however, led to the emergence of only one significant coefficient, namely the one for individuals with traditional or, Animist beliefs. As in the basic model, these individuals continued to have a disadvantage in terms of survival compared to their Protestant counterparts.

In addition, my analysis revealed that Protestants had an advantage in terms of child survival when compared to Muslims. This advantage appeared when no other factors were accounted for, and it persisted even when the socioeconomic determinants were added in my model.

Finally, when it comes to under-five mortality and when no other covariates were added in the model, my analysis revealed that Protestants had on average lower proportions of dead children under the age of five when they were compared to Muslims, non-religious and Traditionalists/ Animists. However, table 12 revealed that Protestants had a disadvantage in terms of under-five survival when they were compared to their Catholic counterparts. The same disadvantage when compared to Catholics continued to exist even when the socioeconomic determinants were accounted for, while the last column of table 12 revealed that Protestants had on average lower proportions of dead children under-five than their Muslim counterparts.

6.3 Results for Model 3

Model 3 was chosen for the examination of the last main hypothesis presented in subsection 3.3. Again, by following the same procedure as in the previous models, I obtained the religion and country coefficients presented in table 13.

Table 13. Modifications of Model 3.

	Infant mortality		**Child mortality**		**Under5 mortality**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Reg13	**Reg14**	**Reg15**	**Reg16**	**Reg17**	**Reg18**
Religion1						
Muslim	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Christian	-0.0095***	-0.0074**	-0.0130***	-0.0088***	-0.0226***	-0.0162***
	(0.0025)	(0.0026)	(0.0021)	(0.0022)	(0.0032)	(0.0034)
Traditional/	0.0099*	0.0055	-0.0075	-0.0113**	0.0028	-0.0059

Animist						
	(0.0047)	(0.0047)	(0.0041)	(0.0041)	(0.0061)	(0.0061)
Other	-0.0069	-0.0026	-0.0107	-0.0053	-0.0189*	-0.0089
	(0.0071)	(0.0070)	(0.0055)	(0.0055)	(0.0091)	(0.0090)
No religion	0.0047	-0.0055	-0.0059	-0.0130***	-0.0024	-0.0204***
	(0.0046)	(0.0047)	(0.0037)	(0.0039)	(0.0058)	(0.0060)
Missing	-0.0384**	-0.0345**	-0.0353***	-0.0307***	-0.0751***	-0.0663***
	(0.0119)	(0.0115)	(0.0076)	(0.0078)	(0.0140)	(0.0136)
Country						
Madagascar	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Burkina Faso	0.0197***	0.0303***	0.0366***	0.0404***	0.0572***	0.0717***
	(0.0035)	(0.0047)	(0.0030)	(0.0039)	(0.0046)	(0.0060)
Benin	0.0161***	0.0239***	0.0301***	0.0360***	0.0479***	0.0624***
	(0.0032)	(0.0044)	(0.0028)	(0.0037)	(0.0043)	(0.0058)
Ethiopia	0.0190***	0.0097	0.0072**	-0.0010	0.0253***	0.0076
	(0.0035)	(0.0050)	(0.0025)	(0.0038)	(0.0043)	(0.0063)
Kenya	0.0115**	0.0035	-0.0012	-0.0016	0.0091	0.0009
	(0.0041)	(0.0056)	(0.0027)	(0.0040)	(0.0050)	(0.0069)
Malawi	0.0179***	0.0168***	0.0207***	0.0239***	0.0379***	0.0412***
	(0.0029)	(0.0042)	(0.0023)	(0.0033)	(0.0038)	(0.0053)
Rwanda	0.0200***	0.0215***	0.0195***	0.0238***	0.0395***	0.0470***
	(0.0036)	(0.0053)	(0.0029)	(0.0042)	(0.0046)	(0.0066)
Sierra Leone	0.0531***	0.0629***	0.0197***	0.0228***	0.0733***	0.0866***
	(0.0052)	(0.0060)	(0.0039)	(0.0045)	(0.0064)	(0.0074)
Zimbabwe	-0.0132***	0.0051	-0.0093***	0.0102**	-0.0232***	0.0169**
	(0.0034)	(0.0049)	(0.0025)	(0.0038)	(0.0043)	(0.0062)
Socioeconomic Determinants		**X**		**X**		**X**
Constant	0.0542***	0.0576***	0.0358***	0.0375***	0.0933***	0.1007***
	(0.0033)	(0.0090)	(0.0026)	(0.0069)	(0.0042)	(0.0115)
Number of obs.	59,014	59,014	59,014	59,014	59,014	59,014
R^2	0.0056	0.0302	0.0092	0.0244	0.0125	0.0521
F	25.8650	18.1423	48.8226	19.3909	66.2319	36.9989
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Robust standard errors in parentheses.
X denotes that the socioeconomic determinants were included in the regression.
The full table is available upon request.
* p<0.05, ** p<0.01, *** p<0.001
Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

By observing table 13 it can be easily seen that when no other covariates were accounted for, Muslims in Madagascar had an advantage in terms of infant survival when compared to those who had traditional or, Animist beliefs; and a disadvantage when they were compared to Christians. In particular, a Christian in Madagascar was expected to have a proportion of dead infants that would be 0.95% lower than the one of its Muslim counterpart, while a woman with traditional or, Animist beliefs, was expected to have a 0.99% higher proportion of dead infants when compared to another woman who also lived in Madagascar but was instead a Muslim. In terms of the country coefficients, lastly, the basic model presented in column (1) revealed significant coefficients for all the countries under question.

Moreover, the inclusion of the socioeconomic determinants in model 3 revealed that the advantage of Christians in terms of infant survival continued to exist with a

Christian mother in Madagascar having a 0.74% lower proportion of dead infants than her Muslim counterpart. In terms of the country coefficients, my analysis revealed that when the socioeconomic determinants were taken into account the coefficients for Ethiopia, Kenya and Zimbabwe became insignificant, while the others were found to be significant at a 0.1% level.

Continuing with the analysis of child mortality, the basic form of model 3 (see Reg15) revealed a significant coefficient for Christians, indicating that a Christian mother who lived in Madagascar was expected to have a proportion of dead children that would be 1.30% lower than the proportion of her Muslim counterpart. In addition, all country coefficients with the exception of Kenya were found to be significant at a 1% level or, less.

When the socioeconomic determinants were added in the model, the coefficient for Ethiopia became insignificant as well, while Muslims were found to have a disadvantage in terms of child survival when compared to Christians, non-religious and Traditionalists/Animists. More specifically, Christians were found to have a proportion of dead children that was 0.88% lower than that of Muslims, while the proportions under question for Traditionalists/Animists and non-religious were found to be lower than the ones for Muslims by 1.13 and 1.30% respectively.

Finally, when it comes to under-five mortality, my analysis revealed that when no other factors were taken into consideration Christians and individuals with other religious beliefs had an advantage in terms of under-five survival when they were compared to their Muslim counterparts. In fact, a Christian mother in Madagascar was expected to have a 2.26% lower proportion of dead children under the age of five when she was compared to a Muslim mother living in the same country, while the respective proportion under question was found to be lower by 1.89% for a mother who had other religious beliefs. In terms of the country coefficients, lastly, table 13 revealed that with the exception of Kenya all were found to be significant at a 0.1% level.

When the socioeconomic determinants were added in model 3, the previously significant coefficient for those with other religious beliefs became insignificant while the coefficient for Christians remained significant denoting that holding all the other factors constant, being a Christian was associated with a lower proportion of dead children under the age of five compared to being a Muslim. In fact, this proportion was 1.62% lower for Christians, while table 13 also revealed that those with no religion seemed to have an advantage in terms of under-five survival when they were compared to Muslims. In fact, having no religion was associated with a 2.04% decrease in the proportion of dead children under-five when compared to being a Muslim. When it comes to the country coefficients, lastly, it has to be mentioned that when the socioeconomic factors were introduced in my analysis all country coefficients, with the exception of Kenya and Ethiopia were found to be significant at a 1% level or, less.

Summing up, the analysis of model 3 revealed that Christians had an advantage in terms of survival when they were compared to Muslims and in fact this advantage was apparent both for infant as well as for child and under-five survival. In addition, in terms of infant survival Muslims were found to have lower proportions of dead infants compared to Traditionalists/Animists, however, this advantage disappeared when several socioeconomic factors were included in model 3. In addition, the inclusion of socioeconomic factors in my analysis revealed that , apart from Christians, non-religious individuals as well as those with traditional or,

Animist religious beliefs were found to have lower proportions of dead children when they were compared to their Muslim counterparts, while finally, my analysis revealed that when it comes to under-five survival, and when no other covariates were taken into consideration, Muslims seemed to have a disadvantage when they were compared to those who had other religious beliefs. The coefficient for those individuals, however, became insignificant when other socioeconomic factors were included in my model, while table 13 revealed the emergence of another significant coefficient, namely the one for non-religious individuals. These individuals, as in the case of Christians had an advantage in terms of under-five survival when all other factors were held constant, and when they were compared to Muslims.

6.4 Results for Model 4[2]

Model 4 was used for the examination of the first additional hypothesis, which stated that the effect of wealth on under-five mortality differs by religion.

Based on this hypothesis, I performed several regressions, in which I included the interaction variable *Religion2*Wealth Index*. Then, by changing each time the reference category (for instance the first time the reference category was *"Protestant/Middle"* then *"Protestant/Poorest"* etc.) I examined how these effects varied among religious groups. In other words I examined whether there are significant differences among religious groups for people belonging in the middle quintile of the wealth index, then in the poorest quintile and so on.

Starting the discussion with those belonging in the poorest quintile of the population my analysis revealed no significant differences in terms of infant mortality. When it comes to child mortality, however, several significant coefficients were detected for Catholics, Muslims, other Christians and those individuals that had other religious beliefs. Briefly, my analysis revealed that Protestants who belonged in the poorest quintile of the wealth index had an advantage in terms of child survival when they were compared to Muslims and persons with other religious beliefs, while they had a disadvantage when they were compared to Catholics and other Christians. In fact, a Muslim who belonged in the poorest element of the population was expected to have a 0.85% higher proportion of dead children than his Protestant counterpart, while the same proportion for the individuals with other religious beliefs was higher than the one of Protestants by 0.62%. Catholics who belonged in the poorest quintile of the wealth index were expected to have a proportion of dead children that would be 0.13% lower than the one of Protestants, while other Christians were expected to have a 0.15% lower proportion of dead children when they were compared to their Protestant counterparts.

Lastly, in terms of under-five mortality significant coefficients were found for Catholics, Muslims as well as for individuals with other religious beliefs. In this case, the advantage of Catholics over Protestants was translated into a 0.28% lower proportion of dead children under the age of five, while Muslims and individuals with other religious beliefs were found to have proportions of dead children under

[2] Due to the multitude of tables I decided to discuss my findings without presenting them into tables, however, these tables are available on request.

the age of five that were 1.49 and 3.55% higher than the ones of their Protestant counterparts.

When it comes to those belonging in the poorer element of the population, my analysis once again revealed no significant differences in terms of infant mortality, while the same was found to be true when it comes to the under-five one.

In terms of child mortality, however, the analysis revealed an advantage for Catholics and other Christians which could be translated in a 0.38 and 0.55% lower proportion of dead children respectively, when these groups where compared to Protestants. In addition, Muslims who belonged in the poorer quintile of the wealth index were expected to have a 0.88% higher proportion of dead children when compared to Protestants, while the same comparison between Protestants and individuals with other religious beliefs would reveal that the latter had a proportion of dead children that was higher by 1.20%.

The analysis of those belonging in the richer element of the population, on the other hand, revealed no significant differences in terms of child and under-five mortality, while it is worth mentioning that only one significant coefficient was found for Muslims in terms of infant mortality. In fact, Muslims who belonged in the richer element of the population were expected to have a proportion of dead infants that would surpass the respective proportion of Protestants by 0.15%.

Lastly, it has to be mentioned that the analysis for those belonging in the middle and richest element of the population revealed that there were no significant differences among religious groups.

Summing up, it can be easily seen that several differences were detected among religious groups but these differences persisted in the lowest and lower socioeconomic classes. In these classes, the effect of wealth on mortality was found to differ significantly among religious groups. These differences, however, 'faded away' in the upper classes.

6.5 Results for Model 5

Model 5 was used in order to test the hypothesis which stated that the effect of being a Christian on under-five mortality will differ by the country in which the individual resides. Based on my formulated hypothesis, I performed a set of regressions; some of their main characteristics are shown in table 14.

Table 14. Model 5- Interactions.

	Infant mortality	**Child mortality**	**Under5 mortality**
Religion4			
Christian	(ref.)	(ref.)	(ref.)
No Christian	-0.0349	0.0440***	0.0116
	(0.0538)	(0.0127)	(0.0500)
Missing	-0.0271	-0.0131	-0.0427*
	(0.0171)	(0.0089)	(0.0198)
Country			
Madagascar	(ref.)	(ref.)	(ref.)
Burkina Faso	0.0221	0.0201	0.0515
	(0.0277)	(0.0233)	(0.0368)

Benin	0.0440	0.0191	0.0637
	(0.0436)	(0.0242)	(0.0469)
Ethiopia	-0.0281	-0.0213	-0.0503
	(0.0216)	(0.0144)	(0.0318)
Kenya	-0.0590**	-0.0189	-0.0783***
	(0.0196)	(0.0104)	(0.0226)
Malawi	-0.0194	0.0530	0.0337
	(0.0194)	(0.0577)	(0.0603)
Rwanda	-0.0016	0.0043	0.0035
	(0.0189)	(0.0105)	(0.0236)
Sierra Leone	0.1063*	-0.0126	0.0921
	(0.0536)	(0.0124)	(0.0498)
Zimbabwe	0.0292	-0.0343*	-0.0078
	(0.0544)	(0.0150)	(0.0513)
Religion4*Country			
Christian/Madagascar	(ref.)	(ref.)	(ref.)
Christian/Burkina Faso	0.0066	0.0099	0.0084
	(0.0279)	(0.0235)	(0.0371)
Christian/ Benin	-0.0197	0.0164	-0.0017
	(0.0436)	(0.0243)	(0.0470)
Christian/Ethiopia	0.0381	0.0184	0.0559
	(0.0217)	(0.0144)	(0.0319)
Christian/Kenya	0.0644***	0.0204*	0.0839***
	(0.0194)	(0.0100)	(0.0224)
Christian/Malawi	0.0362	-0.0290	0.0073
	(0.0194)	(0.0578)	(0.0603)
Christian/Rwanda	0.0229	0.0185	0.0421
	(0.0189)	(0.0105)	(0.0236)
Christian/Sierra Leone	-0.0468	0.0309*	-0.0145
	(0.0543)	(0.0135)	(0.0508)
Christian/Zimbabwe	-0.0224	0.0425**	0.0242
	(0.0544)	(0.0150)	(0.0513)
No Christian/ Madagascar	0.0388	-0.0504***	-0.0162
	(0.0538)	(0.0129)	(0.0501)
No Christian/ Burkina Faso	0.0521	-0.0147	0.0263
	(0.0555)	(0.0235)	(0.0555)
No Christian/ Benin	0.0237	-0.0266	-0.0042
	(0.0649)	(0.0244)	(0.0627)
No Christian/Ethiopia	0.0799	-0.0162	0.0615
	(0.0528)	(0.0148)	(0.0525)
No Christian/Kenya	0.0998	-0.0313**	0.0649
	(0.0523)	(0.0113)	(0.0479)
No Christian/Malawi	0.0791	-0.0742	0.0015
	(0.0521)	(0.0580)	(0.0735)
No Christian/Rwanda	0.0683	-0.0233	0.0432
	(0.0546)	(0.0163)	(0.0521)
Socioeconomic Determinants	**X**	**X**	**X**
Constant	0.0497***	0.0294***	0.0850***
	(0.0088)	(0.0067)	(0.0113)
Number of obs.	59,014	59,014	59,014

R^2	0.0302	0.0246	0.0523
F	17.4105	37.6487	34.4118
Prob>F	0.0000	0.0000	0.0000

Notes: Robust standard errors in parentheses.
X denotes that the socioeconomic determinants were included in the regression.
The full table is available upon request.
* p<0.05, ** p<0.01, *** p<0.001

Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

By taking a first look on the results presented in table 14 it can be easily seen that my analysis revealed very few significant coefficients. Thus, it does not seem that there are great differences among countries in terms of the effect of being a Christian on mortality. However, several significant coefficients were found and they are going to be presented in this subsection.

Starting with infant mortality, my analysis revealed one significant coefficient for the category *"Christian/Kenya"* of my interaction variable. This means that a Christian in Kenya was expected to have a higher proportion of dead infants compared to a Christian in Madagascar, and this proportion was found to be: $0.0644 - 0.0590 = 0.0054$ or, 0.54% higher.

In terms of child mortality, on the other hand, more significant coefficients were detected. In fact, my analysis revealed significant coefficients for Christians who lived in Kenya, Sierra Leone and Zimbabwe.

By following the same procedure as before, it could be argued that Christians in Kenya were expected to have a: $0.0204 - 0.0189 = 0.0015$ or, a 0.15% higher proportion of dead children compared to Christians in Madagascar, while a Christian in Sierra Leone was expected to have a proportion of dead children that would be: $0.0309 - 0.0126 = 0.0183$ or, 1.83% higher than the proportion of a Christian who lived in Madagascar. Finally, a similar picture was found for Christians in Zimbabwe. These individuals were expected to have a proportion of dead children that would be: $0.0425 - 0.0343 = 0.0082$ or, 0.82% higher than the proportion of Christians who lived in Madagascar.

Finally, in terms of under-five mortality, my analysis revealed only one significant coefficient for the category *"Christian/Kenya"* indicating that a Christian in Kenya was expected to have a higher proportion of dead children under the age of five than a Christian who lived in Madagascar, and this proportion is, according to table 14: $0.0839 - 0.0783 = 0.0056$ or, 0.56% higher.

Summing up, it could be argued that the examination of model 5 revealed minor differences among countries concerning the effect of being a Christian. In fact, in terms of infant and under-five mortality Christians in Madagascar were found to have an advantage in terms of survival when compared to Christians in Kenya. This advantage was also found when it comes to child survival, however, my analysis revealed that apart from Christians in Kenya, also those living in Sierra Leone and Zimbabwe were found to have higher proportions of dead children when they were compared to Christians in Madagascar.

6.6 Discussion[3]

The first parts of section 6 dealt with the presentation of the results for each model used in my analysis. In this subsection these results will be revised and a more detailed discussion of them will take place.

6.6.1 Discussion of Model 1

In subsection 6.1, I examined the differences among religious and non-religious individuals in terms of under-five mortality, and in particular, I focused on the hypothesis that religious persons seem to have an advantage in terms of survival when compared to their non-religious counterparts.

However, even though previous research on adult and child mortality found support for this hypothesis, the results concerning infant, child and under-five mortality in my analysis seem to disprove it, especially when several socioeconomic factors are taken into consideration.

More specifically, in terms of child mortality the analysis revealed no significant coefficients for those with no religion in both modifications of model 1. In fact, the examination of the basic form of model 1 revealed that the proportion of dead children aged 1-4 was found to be explained by the country in which the individual resides, while later it was found to be explained by a range of socioeconomic factors including among others the mother's age, the age of the household head, the justification of domestic violence (wife beating) and the household's wealth.

In terms of infant and under-five mortality, however, the results were somewhat different. Again, in these cases the coefficients for the non-religious individuals became insignificant when the socioeconomic determinants were added in the model; however, there was a clear advantage in terms of survival for those who had any religion when no other covariates were accounted for. This means that there may be something in terms of religion that affects directly the proximate determinants. In the theoretical framework of this study we saw that the proximate determinants refer to maternal factors, injury, environmental contamination, nutrient deficiency and personal illness control (Mosley & Chen, 1984). Therefore, it could be argued that several religions have certain 'rules' about these things that maybe a non-religious person ignores. For instance, in Islam, the advices towards parenthood and child rearing begin long before the child's birth, while several preparations have to be made by the expectant parents throughout pregnancy (Stacey, 2010). In fact, according to Stacey (2010), the expectant mother is advised to have a healthy diet, rest, and seek medical advice when needed, while, when the child is born, Muslim mothers are advised to breastfeed the child for at least two years (Stacey, 2010; Quran 2:233, Clearquran.com). Similar advices can be found in nearly all religions, and it could be argued that the ignorance of them by a non-religious person could lead to an increased proportion of dead infants or, children under the age of five.

[3] Because of the multitude of variables in my models, I chose to just mention briefly the significant coefficients without presenting them into tables. Nevertheless, these tables are available upon request.

6.6.2 Discussion of Model 2

The second model presented in subsection 6.2 focused on the various religious groups by examining the hypothesis which stated that Catholics will have an advantage in terms of infant, child and under-five survival when compared to Protestants. In terms of infant mortality, my analysis revealed no significant coefficients for Catholics, while a clear advantage of Protestants over Muslims, non-religious and Animists was found when no other covariates were taken into consideration.

These differences in mortality can once again be attributed to differences in health and nutrition practices among religions that may have a direct impact on several proximate determinants. For instance, Pike (2015) argued that Animist religions revolve around the fact that spirits can be harmful and revengeful if they are not properly treated. Thus, an Animist's life is characterized by a constant fear and an effort to placate these spirits (Pike, 2015). When it comes to sickness and death, these are usually considered to be sent by the spirits and individuals try to 'fool' them by, for instance, keeping secret the real name of the child or, by dressing the sick boys as girls (Pike, 2015). Of course, as it can be easily understood when someone is sick, dressing him as a girl or, giving him a nickname will not make much of a difference in terms of its health. Apart from this, Animist religions tend to have a person (a sorcerer or a shaman) who is responsible, among other things, for healing the sick (Pike, 2015). Again in this case traditional medicine cannot be considered as effective as modern medicine and this could explain the disadvantage of this religious group in terms of infant survival. Finally, according to Pike (2015), Animism, unlike other major religions (Islam, Christianity, Hinduism etc.) does not include any set of rules to be followed by its adherents. This could also explain the higher proportions of dead infants found in my analysis, while it could be argued that the lack of these rules can also explain in a great extent the disadvantage of non-religious individuals when they are compared to Protestants.

When it comes to Muslims, finally, again several practices could account for their disadvantage in terms of infant survival presented in model 2. In terms of breastfeeding practices, sanitation and prenatal care, I failed to identify any practice that could be characterized as particularly harmful. In fact, as already mentioned Muslim women are advised to breastfeed for two years, have a healthy diet and receive medical advice when needed (Stacey, 2010), while personal hygiene is also considered of great importance (Stacey, 2009). However, I identified two practices that could be harmful in some circumstances. The first one is the practice of circumcision, a practice which is compulsory for males in Islam (Stacey, 2009; Stacey, 2010). This practice is customary for hygienic purposes; however, it could be argued that it can lead to injury or, infections if done by an unqualified person, if performed in an unsanitary environment or, if the instruments used are not sterilized. The second practice that may be harmful for a mother's or, infant's health, finally, is a practice called "*aqeeqah*" (Stacey, 2010) and it refers to the welcoming of the newborn baby. Although it is not compulsory, when a baby is born it is common for the family to slaughter sheep and invite relatives and neighbors in the house for a meal (Stacey, 2010). This is done in order to celebrate the arrival of the new family member; however, it could be argued that it can enable the transmission of diseases and germs, a fact that is likely to harm both the mother and the new born baby.

When the socioeconomic determinants were taken into consideration, however, only one significant coefficient was found, indicating that Protestants seemed to have an advantage in terms of survival when compared to those with traditional or, Animist religious beliefs. Apart from this, several other factors were found to be associated with infant mortality. These, included among others the mother's age and educational level, the household's wealth, the mother's occupation as well as the father's educational attainment.

As mentioned earlier, this differential in infant mortality could be explained by differences in terms of practices among those two groups. In fact, Saabneh (2014) argued that differentials in mortality among various ethnic and religious groups can sometimes be attributed to differences in cultural practices, geographic concentration or, socioeconomic status of these groups. From the above, it can be easily seen that differences in socioeconomic status may also explain in a great extent the observed disadvantage of Traditionalists/Animists in terms of infant survival. Indeed, further examination of my dataset revealed that the majority of Protestants belonged in the richer quintile of the wealth index, while the majority of those with traditional or, Animist beliefs belonged in the poorest element of the population. In addition, in terms of educational level (both of mother and father's) the majority of Traditionalists/Animists had no education, while the majority of Protestants had a completed primary education. Based on these findings I performed some additional regressions in which I included the interactions of religion, with parents' education, as well as with their occupation and wealth. These regressions, which I chose not to present here, revealed significant differences between Protestants and Traditionalists/ Animists in terms of the mother's occupation.

In terms of child mortality, my analysis revealed that Protestants seemed to have an advantage in terms of survival when they were compared to Muslims and this advantage persisted even when the socioeconomic determinants were included in the model. As mentioned above, this differential in mortality can either be explained by differences in certain practices among these two religious groups, or, by differences in terms of their socioeconomic status. In fact, further examination of my dataset, revealed once again that the majority of Muslims belonged in the poorest element of the population, while when it comes to education (both of mother and father's) the majority of them were found to have no education. Indeed, further analysis revealed significant differences between Protestants and Muslims both in terms of wealth and when it comes to the parents' educational level.

When it comes to under-five mortality, finally, the results of my analysis agreed with my expectations and coincided with the findings from previous research. In fact, Catholics were found to have an advantage over Protestants when it comes to under-five survival. This advantage appeared when no other factors were accounted for, but it also continued to exist with the inclusion of other socioeconomic factors in my analysis. Apart from this, Muslims, non-religious and Traditionalists/Animists were once again found to have a higher proportion of dead children under the age of five when they were compared to Protestants, while the disadvantage of Muslims continued to exist even when the socioeconomic determinants were included in my analysis.

Once again, it could be argued that these differentials in mortality can be both due to differences in practices among these religious groups and due to socioeconomic differences. In fact, further analysis on this topic revealed significant differences

between Muslims and Protestants in terms of wealth, as well as in terms of the parents' educational attainment.

When it comes to the differential in mortality between Catholics and Protestants, finally, it could be argued that this can be explained both by small differences in terms of their religion and by differences in their socioeconomic status. In fact, based on the findings of Emile Durkheim as presented by Jarvis and Northcott (1987) it could be argued that Catholics tend to have more frequent social interactions than Protestants as it is required by their beliefs to participate in more religious events in order to obtain their salvation. Therefore, according to Diffen.com (2015) a Catholic must perform certain activities as a mean of salvation, and these activities include, among others the participation in Mass, the Seven Sacraments and confession. Protestants, on the other hand, have as a common practice to commune with other believers on Sunday; however, they require a less frequent participation in the liturgical life of the church when compared to Catholics (Diffen.com, 2015; Religionfacts.com, 2015). Based on the above, it could be argued that the advantage of Catholics can be explained by the fact that religiosity and social interactions can serve as a mean of support in times of need as well as a way for the diffusion of ideas and advices concerning hygiene, child rearing and personal illness control. Another explanation for this differential could be the fact that Catholics seem to follow a more 'common line' in terms of access to health care than Protestants (see subsection 3.2), while, apart from this, further analysis on this topic also revealed significant differences between these two groups both in terms of wealth as well as in terms of the mother's education and occupation

6.6.3 Discussion of Model 3

Model 3 on the other hand, was used for the examination of the hypothesis which stated that Muslims will have a higher proportion of dead infants; children aged 1-4 and children under the age of five when compared to Christians. In fact, my analysis found support for this advantage of Christians in terms of survival, something that was true also when several socioeconomic determinants were included in my model. Based on the discussion until now it could be argued that this difference in mortality can be explained either by small differences in terms of cultural practices or, by socioeconomic differences. In fact, further analysis revealed significant differences between Muslims and Christians when it comes to parents' education as well as in terms of wealth.

Apart from these, however, my analysis revealed several other significant coefficients. Thus, in terms of infant survival and when no other covariates were taken into consideration, Muslims seemed to have an advantage in terms of survival when they were compared to Traditionalists/Animists. This advantage, as already mentioned can be explained by differences in practices between these two religious groups that can have a direct effect on several proximate determinants of survival.

In addition, when it comes to child survival and when the socioeconomic determinants were taken into consideration, my analysis revealed that Muslims had a disadvantage when compared to non-religious individuals and Traditionalists/Animists. Further analysis on this topic revealed significant differences between Muslims and non-religious individuals in terms of the mother's education, while no significant differences were found between Muslims

and Traditionalists/Animists in terms of parents' education and occupation as well as in terms of wealth.

Finally, when it comes to under-five survival and when no other covariates were taken into consideration Muslims were found to have a disadvantage in terms of survival when they were compared to individuals with other religious beliefs. Once again, this differential in mortality could be explained by differences in culture and practices between these two religious groups.

When the socioeconomic determinants were taken into consideration, however, the previously significant coefficient for individuals with other religious beliefs became insignificant, while Muslims were found to have a disadvantage in terms of survival when compared to non-religious individuals. Once again, further analysis revealed significant differences between Muslims and non-religious in terms of the mother's education and these differences could explain in a great extent the observed differential in mortality.

6.6.4 Discussion of Models 4 and 5

Finally, apart from the main hypotheses I also examined two additional ones. The first one was presented in subsection 6.4 and referred to the effect of wealth on under-five mortality, and in particular, whether this effect differs among religious groups.

Some significant differences have been identified among religious groups in the lowest and lower social classes, however, these differences became weaker and later disappeared in the upper classes.

In fact, when it comes to infant mortality one significant coefficient was found and it indicated that Muslims who belonged in the richer element of the population had on average a higher proportion of dead infants than their Protestant counterparts.

In terms of child mortality on the other hand, several significant differences were detected for individuals belonging in the poorest and poorer quintile of the wealth index. Thus, Protestants who belonged in the poorest element of the population were found to have an advantage in terms of child survival when compared to Muslims and individuals with other religious beliefs and a disadvantage when they were compared to Catholics and other Christians. The exact same pattern was found when the examination of those belonging in the poorer element of the population took place.

Finally, when it comes to under-five mortality several significant differences were found for the individuals belonging in the poorest element of the population. In this case Protestants had an advantage in terms of under-five survival when they were compared to Muslims and individuals with other religious beliefs, while they were found to have on average higher proportions of dead children under the age of five than Catholics who also belonged in the lowest socioeconomic class.

Based on the above it could be argued that in the poorest elements of the population the effect of differences in health and nutrition practices, or, restricted access to health care proposed by various religions may be more pronounced. As we move towards the upper classes, however, religion differences disappear and this can be explained by the fact that having a better socioeconomic status in the

sense that individuals become more wealthy 'covers' in a great extent these small differences among religious practices.

By using again the example of circumcision it could be argued that a Muslim who belongs in a low social class may not be able to afford having his child circumcised in a hospital or, a health clinic. This, as mentioned earlier, can lead to infections and injuries and can be associated with an observed higher mortality rate for Muslim children. If someone compares this Muslim with a Protestant who is not obliged by his religion to circumcise his child, he or, she will be able to find some differences in infant or, child survival among these individuals. In the higher socioeconomic classes, however, these differences may disappear. Not because, these differences in religious practices disappear, Muslims in the upper classes also practice circumcision, but rather, because they may be more likely to afford going to a hospital to perform it.

Lastly, I examined whether the effect of being a Christian differs by country. The stimulus for this examination was given by the fact that the nine countries of my study are composed of different religious groups and the Christian element is in some cases a majority (for instance Ethiopia) while in others it is a minority (for instance Sierra Leone). In general, my analysis revealed minor significant differences among countries.

In fact, in terms of infant and under-five mortality, significant differences have been identified only between Christians in Madagascar and Christians in Kenya and they indicated that being a Christian in Kenya is associated with a higher proportion of dead infants and dead children under the age of five compared to being a Christian in Madagascar.

Lastly, in terms of child mortality a few significant coefficients were found between Christians in Madagascar and Christians in Kenya, Sierra Leone and Zimbabwe. As in the previous case, Christians in Madagascar were found to have an advantage in terms of child survival when they were compared to their counterparts in the three aforementioned countries.

These differences could be explained by various factors. First, and as already mentioned in some countries Christians constitute a minority, this could explain their disadvantage in Sierra Leone. In addition, tables 4 and 6 in section 2 revealed that there are also some differences in terms of physicians, poverty and inequality in the countries under question. Thus, it could be argued that this can explain the disadvantage of Christians in Sierra Leone and Zimbabwe. Moreover, these differences can also be attributed to the different socioeconomic status of Christians in the nine countries under question. In this extent, further examination of my dataset revealed that while the majority of Christians in Madagascar belonged in the richest element of the population, the majority of Christians in Zimbabwe belonged in the poorest quintile in terms of wealth. Finally, these differences can also be attributed to the different composition of Christians in the countries under question. As already seen from the examination of model 2, differences in mortality have also been identified among Christian denominations. In fact, according to CIA (2014a, b, c, d, e, f, g, h, i) it is possible to see that the percentage of Christian denominations varies among the nine countries under question. This could also explain the fact that in some countries such as Kenya and Zimbabwe, with higher proportions of Protestants it is possible to identify a disadvantage of Christians in terms of survival.

Section 7: Conclusions

The impact of socioeconomic factors on adult and under-five mortality is a subject which has been widely discussed. Therefore, one can find several studies concerning the association between mortality and, for example, income, age, or, educational level. However, one cannot say the same about the impact of religion on mortality and in fact, most of the existing literature has focused on the impact of religion on disease-specific mortality among adults.

The purpose of this paper was to examine the impact of religion, both on under-five mortality and on its subdivisions, namely the infant and child one. The rationale behind this choice was the fact that religions, all over the world, include several rules and advices that can either promote or, 'condemn' the longevity of their followers.

In order to conduct my analysis, a set of nine low-income countries of sub Saharan Africa was chosen, and by using data provided by the Demographic and Health Surveys Program, I obtained a study sample of 59,014 women aged 15-49, who shared several common characteristics. In fact, all of them were usual residents and had a singleton born six to ten years before the DHS interview took place.

Next, by using OLS I examined five hypotheses, three main and two additional ones.

The first hypothesis dealt with religiosity and in particular it examined whether religious people tend to have lower mortality rates than their non-religious counterparts. Unlike previous research, however, my analysis revealed that this was not the case especially when several socioeconomic factors were taken into consideration. More specifically, in terms of child mortality, no significant coefficients were found, while when it comes to infants and children under the age of five, an advantage of religious over non-religious persons was detected when no other factors were taken into consideration. As discussed earlier, this could be explained by the fact that religions in general tend to have some advices and rules that may affect directly some proximate determinants and that may be ignored by a non-religious person.

In addition, I examined the impact of religious affiliation on mortality. Thus, based on previous research, I examined a hypothesis stating that Catholics will have on average a lower proportion of dead infants; children aged 1-4 or, children under the age of five than their Protestant counterparts. In this case, my analysis found support for this hypothesis only when it comes to under-five mortality. Further research on this topic, revealed that this differential can either be explained by the fact that Catholics have on average more frequent social interactions with other people and by differences in their socioeconomic status in terms of wealth and mother's education and occupation.

Apart from this, however, my analysis revealed several other significant coefficients especially when the socioeconomic determinants were included in the model. Thus, Protestants seemed to have an advantage over Animists in terms of infant survival, a fact that can be explained both by socioeconomic differences in terms of mother's occupation and by differences in health and nutrition practices among these religious groups. While finally, Protestants were found to have an advantage in terms of child and under-five survival when they were compared to

their Muslim counterparts. Once again, this differential in mortality can be attributed both to differences in practices and to socioeconomic differences in terms of wealth and parents' education.

Continuing with the association between mortality and religious affiliation, I examined a hypothesis stating that Muslims will have a disadvantage in terms of infant, child or, under-five survival when compared to Christians. The results of my analysis concerning this case, agreed with my expectations and in fact, Christians were found to have an advantage in terms of survival in all categories under question. Again, this fact can be explained either by minor differences in terms of the advices proposed by these major religions or, by several socioeconomic differences in terms of wealth and parents' education.

Finally, the examination of model 3 revealed that apart from Christians, Traditionalists or, Animists as well as non-religious individuals seemed to have an advantage in terms of child survival when compared to Muslims, while the same was true for non-religious in terms of under-five survival. Further examination on this topic revealed significant differences in terms of the mother's educational level between Muslims and non-religious, while no significant differences have been identified between Traditionalists and Muslims in terms of wealth, parents' education or, parents' occupation. This finding was quite puzzling and it could be argued that since these groups seem to have the same socioeconomic status in my dataset, this differential can either be explained by some differences in practices towards health and sanitation, or, it is explained by some other socioeconomic factors.

Apart from the main hypotheses, lastly, two additional ones were examined as well. The first stated that the effect of wealth on mortality will differ by religion, and in fact, significant differences among religions have been identified in the lowest and lower socioeconomic classes. The second additional hypothesis, on the other hand, stated that the effect of being a Christian on mortality will differ by the country in which the individual resides. In general my analysis revealed minor differences with Christians in Kenya having a disadvantage in terms of infant and under-five survival when compared to Christians in Madagascar and Christians in Kenya, Sierra Leone and Zimbabwe having higher proportions of dead children when compared to their counterparts in Madagascar.

Summing up, my analysis revealed several differences in under-five mortality among religious groups and it could be argued that differences in practices as well as differences in socioeconomic status seem to be the strongest 'candidates' when it comes to their explanation. However, one should be cautious when it comes to the drawing of conclusions. In fact, there are several problems concerning the interpretation of the relationship between mortality and religion and these are extensively discussed in Jarvis and Northcott (1987). The most important of them, in my opinion, is the fact that each reader of this paper can interpret differently the results presented above. For instance, an economist or, a sociologist could give more weight to the socioeconomic explanations of this study, while a theologian could focus more on the explanations concerning differences in religious practices. Second, in such studies, it is difficult to examine the extent to which each individual complies with the rules and behaviors proposed by its religion. The DHS surveys provided information solely on religious affiliation, however, not all Christians, for instance, have the same religious participation or, even it could be argued that not all Muslims follow exactly all the advices of their religion

concerning nutrition, sanitation and child nurturing. Again, all these things have to be taken into consideration when drawing conclusions from this study. Lastly, in such studies, it is very difficult to distinguish between where the socioeconomic impact stops and where the religious impact begins. The line between those two is a very thin one and in fact several differences between social status and religious affiliation have been detected in my study. An interesting question for future research could be "Do certain religions attract individuals from a lower socioeconomic status?".

Finally, more detailed information concerning a person's religious participation, a person's compliance with several important religious rules, as well as a better division of individuals among Protestant denominations could give better, and more interesting results in future studies.

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Appendix

A.1 Selection of the Study Sample

As already seen in table 7, my original sample consisted of 130,451 observations concerning women aged 15-49.

The first step towards the restriction of my original sample stemmed from my interest in examining infant and child mortality. In order to do so, I chose to focus on those individuals that had at least one child ever born at the time of the study. Thus, from the total of 130,451 women I deleted 34,279 that never had a child and I was left with a sample of 96,172 observations.

Next, I chose to focus only on singletons. The rationale behind this choice can be found in the fact that although twins usually account for a small proportion of total births; they exhibit a higher infant mortality rate compared to singletons (Guo & Grummer-Strawn, 1993).

In fact, according to Guo and Grummer-Strawn (1993) the higher fatality among twins has been observed in both developed and developing countries and can be attributed both to biological or, genetic factors, such as the restrained capacity of the human uterus to sustain more than one fetuses, and to exogenous factors like for instance socioeconomic ones.

Keeping this in mind, it could be argued that when examining under-five mortality rates, the inclusion of both twins and singletons in the same study could lead to problems concerning the reliability of the study's results. Therefore, to avoid this, I chose to exclude twins from my study.

Based on my dataset, I calculated the number of singletons ever born by each female and I identified 214 cases where the women under question never had a single birth. Thus, I dropped these observations and I obtained a sample consisting of 95,958 women.

After obtaining the data set of 95,958 observations, I had to cope with another limitation, namely the time component. As already mentioned, my data set consists of women aged 15-49. Within this age interval there were several women that had children many years before the survey took place. For instance, some women in my dataset had their first child born in the late 1970s.

However, in other studies dealing with mortality (see for example, Guo & Grummer-Strawn, 1993; Eugene & Sdumo, 2012) there is a tendency to examine births that took place in a relatively recent period. This is because we cannot expect that a woman's current income is representative of its financial condition say for example 20 years ago. Moreover, and especially in developing countries, it would be somewhat rough to assume that advances in medicine, or, attitudes towards breastfeeding or immunization would be the same for such long periods of time.

Thus, in order to cope with this limitation I decided to proceed as follows: In accordance with other studies I used only those births that occurred in relatively recent periods. However, unlike Guo and Grummer-Strawn (1993) who used five years, I chose to use those births that occurred six to 10 years before the survey. By doing this, I made sure that all children that are alive in my sample were at least five years old when the survey took place. The reason behind this choice, is the fact

that when the survey takes place, for instance, in 2008, then a child born in say 2005 will be still at risk of dying before reaching the age of five. Therefore, by doing so, I will eliminate the risk of reaching wrong conclusions by examining a child that was alive at the time of the survey, but died for instance one month later.

As already mentioned, however, the surveys used in this study took place during different years in the countries under question. I used the available information in order to learn the exact year that the interviews took place in each country and I chose the time periods for births based on this. In the case where the interviews were conducted in different years (for instance 2008 and 2009) I used the initial year as a starting point.

After calculating the number of singletons ever born within the chosen periods, I found out that 36,225 women never had a singleton six to 10 years before the interview of the survey took place. Therefore, these observations were dropped from my sample leaving me with 59,733 observations as shown in table A1.

Table A1. Sample selection.

Country	Year of DHS survey	Number of women who ever had a singleton	Year(s) the interview took place	Years used in the study concerning births	Number of women who ever had a singleton in the specified period
Benin	2006	13,770	2010	2000-2004	8,893
Burkina Faso	2010	13,230	2006	1996-2000	8,924
Ethiopia	2011	10,872	2003	1993-1997	6,970
Kenya	2008/2009	6,087	2008 & 2009	1998-2002	3,456
Madagascar	2008/2009	12,958	2008 & 2009	1998-2002	7,633
Malawi	2010	17,998	2010	2000-2004	11,720
Rwanda	2010	8,474	2010 & 2011	2000-2004	5,005
Sierra Leone	2008	5,860	2008	1998-2002	3,690
Zimbabwe	2010/2011	6,709	2010 & 2011	2000-2004	3,442
Total		95,958			59,733

Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

Finally, and as I wanted to examine several household characteristics, I decided to include in my study sample only those women that were usual residents. Therefore, I deleted the observations that referred to visitors (703 in total) and those that were

missing (16 in total) and thus, I ended up with a final dataset of 59,014 observations.

A.2 Tables for the descriptive statistics and the bivariate analysis of section 4.

In this section, the tables for the descriptive statistics, as well as those for the bivariate analysis discussed in section 4, can be found.

Table 9. Descriptive Statistics.

Basic categorical variables that will be used in all models					
Variable	**Frequency**	**Percent**	**Variable**	**Frequency**	**Percent**
Country			***Mother's educational level***		
Benin	8,785	14.89	No education (ref.)	28,656	48.56
Burkina Faso	8,866	15.02	Primary	22,186	37.59
Ethiopia	6,852	11.61	Secondary	7,397	12.53
Kenya	3,411	5.78	Higher	773	1.31
Madagascar (ref.)	7,580	12.84	Missing	2	0.00
Malawi	11,569	19.60	**Total**	59,014	100.00
Rwanda	4,954	8.39	***Walls material***		
Sierra Leone	3,667	6.21	Natural (ref.)	21,420	36.30
Zimbabwe	3,330	5.64	Rudimentary	12,017	20.36
Total	59,014	100.00	Finished	24,755	41.95
Respondent's current age			Other/ Missing	822	1.39
15-19	61	0.10	**Total**	59,014	100.00
20-24	3,878	6.57	***Currently Married***		
25-29	14,882	25.22	Yes (ref.)	47,406	80.33
30-34 (ref.)	14,926	25.29	No	11,608	19.67
35-39	12,120	20.54	**Total**	59,014	100.00
40-44	7,846	13.30	***Wife beating justified***		
45-49	5,301	8.98	No (ref.)	32,333	54.79
Total	59,014	100.00	Yes	26,017	44.09
Refrigerator			Don't know/ Missing	664	1.13
No (ref.)	56,499	95.74	**Total**	59,014	100.00
Yes	2,487	4.21	***Opinion Importance***		
Missing	28	0.05	Not Important (ref.)	23,495	39.81
Total	59,014	100.00	Important	19,282	32.67
Drinking Source			Other/Missing	16,237	27.51
Not improved (ref.)	20,209	34.24	**Total**	59,014	100.00
Improved	38,770	65.70	***Television***		
Missing	35	0.06	No (ref.)	50,137	84.96
Total	59,014	100.00	Yes	8,822	14.95
Telephone			Missing	55	0.09
No (ref.)	57,724	97.81	**Total**	59,014	100.00
Yes	1,224	2.07	***Time to get to water source***		
Missing	66	0.11	On premises (ref.)	8,309	14.08
Total	59,014	100.00	Less than 30 minutes	29,935	50.73
Husband or, partner's			More than	20,350	34.48

occupation			30minutes		
Blue collar (ref.)	44,638	75.64	Don't know/ Missing	420	0.71
White or, Pink collar	12,118	20.53	**Total**	59,014	100.00
No occupation/ Other/Missing	2,258	3.83	***Floor material***		
Total	59,014	100.00	Natural (ref.)	35,441	60.06
Respondent's occupation			Rudimentary	4,587	7.77
Blue collar (ref.)	32,653	55.33	Finished	18,839	31.92
White or, Pink collar	14,217	24.09	Other/ Missing	147	0.25
No occupation	11,807	20.01	**Total**	59,014	100.00
Other/Missing	337	0.57	***Age of household head***		
Total	59,014	100.00	Less than 30	6,486	10.99
Smoking			30-39 (ref.)	22,325	37.83
Non-smoker (ref.)	55,628	94.26	40-49	17,651	29.91
Smoker	3,342	5.66	50-59	7,423	12.58
Missing	44	0.07	60+	5,110	8.66
Total	59,014	100.00	Missing	19	0.03
Toilet type			**Total**	59,014	100.00
Non improved (ref.)	50,403	85.41	***Radio***		
Improved	8,563	14.51	No (ref.)	23,059	39.07
Missing	48	0.08	Yes	35,934	60.89
Total	59,014	100.00	Missing	21	0.04
Sex of household head			**Total**	59,014	100.00
Male (ref.)	46,482	78.76	***Wealth Index***		
Female	12,532	21.24	Poorest	13,629	23.09
Total	59,014	100.00	Poorer	11,800	20.00
Roof material			Middle (ref.)	11,507	19.50
Natural (ref.)	25,320	42.91	Richer	11,488	19.47
Rudimentary	3,936	6.67	Richest	10,590	17.94
Finished	29,424	49.86	**Total**	59,014	100.00
Other/ Missing	334	0.57	***Husband or, partner's educational level***		
Total	59,014	100.00	No education (ref.)	22,972	38.93
			Primary	21,401	36.26
			Secondary	10,804	18.31
			Higher	1,714	2.90
			Don't know/Missing	2,123	3.60
			Total	59,014	100.00

Religion variables (*Religion3* will be used in model 1, *Religion2* will be used in model 2 and 4, *Religion1* will be used in Model3 and *Religion4* will be used in model 5)

Variable	**Frequency**	**Percent**	**Variable**	**Frequency**	**Percent**
Religion3			***Religion4***		
Any religion (ref.)	55,873	94.68	Christian (ref.)	36,809	62.37
No religion	2,992	5.07	No Christian	22,056	37.37
Missing	149	0.25	Missing	149	0.25
Total	59,014	100.00	**Total**	59,014	100.00
Religion1			***Religion2***		
Muslim (ref.)	15,165	25.70	Muslim	15,165	25.70
Christian	36,809	62.37	Catholic	11,822	20.03
Traditional/ Animist	3,106	5.26	Protestant (ref.)	15,300	25.93
Other	793	1.34	Other Christian	9,687	16.41
No religion	2,992	5.07	No religion	2,992	5.07
Missing	149	0.25	Traditional/ Animist	3,106	5.26

Total	59,014	100.00	Other	793	1.34
			Missing	149	0.25
			Total	59,014	100.00
Interaction Variables					
Religion2*Wealth Index (will be used in model 4)					
Category	**Frequency**	**Percent**	**Category**	**Frequency**	**Percent**
Protestant/Middle	2,971	5.03	Muslim/Middle	3,019	5.12
Protestant/Poorest	3,114	5.28	Muslim/Poorest	3,498	5.93
Protestant/Poorer	2,890	4.90	Muslim/Poorer	2,922	4.95
Protestant/Richer	3,171	5.37	Muslim/Richer	3,066	5.20
Protestant/Richest	3,154	5.34	Muslim/Richest	2,660	4.51
Catholic/Middle	2,371	4.02	No religion/Middle	431	0.73
Catholic/Poorest	2,126	3.60	No religion/Poorest	1,428	2.42
Catholic/Poorer	2,300	3.90	No religion/Poorer	731	1.24
Catholic/Richer	2,512	4.26	No religion/Richer	299	0.51
Catholic/Richest	2,513	4.26	No religion/Richest	103	0.17
Traditional Animist/Middle	622	1.05	Other/Middle	115	0.19
Traditional Animist/Poorest	1,117	1.89	Other/Poorest	158	0.27
Traditional Animist/Poorer	855	1.45	Other/Poorer	132	0.22
Traditional Animist/Richer	431	0.73	Other/Richer	159	0.27
Traditional Animist/Richest	81	0.14	Other/Richest	229	0.39
Other Christian/Middle	1,954	3.31	Missing/Middle	24	0.04
Other Christian/Poorest	2,169	3.68	Missing/Poorest	19	0.03
Other Christian/Poorer	1,946	3.30	Missing/Poorer	24	0.04
Other Christian/Richer	1,816	3.08	Missing/Richer	34	0.06
Other Christian/Richest	1,802	3.05	Missing/Richest	48	0.08
			Total	59,014	100.00
Religion4*Country (will be used in model 5)					
Category	**Frequency**	**Percent**	**Category**	**Frequency**	**Percent**
Christian/Madagascar	5,044	8.55	No Christian/ Madagascar	2,475	4.19
Christian/Burkina Faso	2,462	4.17	No Christian/ Burkina Faso	6,372	10.80
Christian/ Benin	4,124	6.99	No Christian/ Benin	4,639	7.86
Christian/Ethiopia	3,883	6.58	No Christian/Ethiopia	2,966	5.03
Christian/Kenya	2,663	4.51	No Christian/Kenya	746	1.26
Christian/Malawi	10,048	17.03	No Christian/Malawi	1,513	2.56
Christian/Rwanda	4,778	8.10	No Christian/Rwanda	168	0.28
Christian/Sierra Leone	816	1.38	No Christian/Sierra Leone	2,838	4.81
Christian/Zimbabwe	2,991	5.07	No Christian/ Zimbabwe	339	0.57
Missing/Madagascar	61	0.10	Missing/Malawi	8	0.01
Missing/Burkina Faso	32	0.05	Missing/Rwanda	8	0.01
Missing/ Benin	22	0.04	Missing/Sierra Leone	13	0.02

Missing/Ethiopia	3	0.01	Missing/Zimbabwe	0	0.00
Missing/Kenya	2	0.00	**Total**	59,014	100.00

Notes: ref. = Reference category
Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

Table 10. Bivariate Descriptive Statistics – Independent variables by proportion of dead infants/ children/ under-five.

	Summary of proportion dead infants		**Summary of proportion dead children**		**Summary of proportion dead under five**	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Religion1						
Muslim	0.0790	0.2258	0.0598	0.1980	0.1423	0.2954
Christian	0.0583	0.1960	0.0372	0.1592	0.0983	0.2521
Traditional/ Animist	0.0801	0.2244	0.0577	0.1951	0.1427	0.2908
Other	0.0550	0.1828	0.0333	0.1411	0.0903	0.2380
No religion	0.0625	0.1981	0.0363	0.1553	0.1011	0.2503
Missing	0.0296	0.1453	0.0168	0.0903	0.0487	0.1698
Total	0.0648	0.2057	0.0439	0.1718	0.1119	0.2664
Religion2						
Muslim	0.0790	0.2258	0.0598	0.1980	0.1423	0.2954
Catholic	0.0562	0.1907	0.0390	0.1621	0.0981	0.2503
Protestant	0.0555	0.1928	0.0333	0.1511	0.0919	0.2451
Other Christian	0.0653	0.2069	0.0410	0.1678	0.1088	0.2647
No religion	0.0625	0.1981	0.0363	0.1553	0.1011	0.2503
Traditional/ Animist	0.0801	0.2244	0.0577	0.1951	0.1427	0.2908
Other	0.0550	0.1828	0.0333	0.1411	0.0903	0.2380
Missing	0.0296	0.1453	0.0168	0.0903	0.0487	0.1698
Total	0.0648	0.2057	0.0439	0.1718	0.1119	0.2664
Religion3						
Any religion	0,0651	0,2062	0.0444	0.1728	0.1126	0.2674
No religion	0,0625	0,1981	0.0363	0.1553	0.1011	0.2503
Missing	0,0296	0,1453	0.0168	0.0903	0.0487	0.1698
Total	0.0648	0.2057	0.0439	0.1718	0.1119	0.2664
Protestant/Middle	0,0606	0,2035	0,0384	0,1653	0,1027	0,2625
Protestant/Poorest	0,0619	0,1957	0,0431	0,1637	0,1082	0,2540
Protestant/Poorer	0,0595	0,1979	0,0382	0,1629	0,1009	0,2547
Protestant/Richer	0,0478	0,1785	0,0307	0,1443	0,0828	0,2321
Protestant/Richest	0,0483	0,1882	0,0170	0,1136	0,0667	0,2194
Catholic/Middle	0,0594	0,1909	0,0420	0,1694	0,1046	0,2549
Catholic/Poorest	0,0639	0,2015	0,0523	0,1814	0,1208	0,2707
Catholic/Poorer	0,0689	0,2087	0,0454	0,1743	0,1173	0,2701
Catholic/Richer	0,0489	0,1796	0,0350	0,1525	0,0869	0,2360
Catholic/Richest	0,0422	0,1729	0,0230	0,1314	0,0664	0,2169
Muslim/Middle	0,0800	0,2234	0,0612	0,1983	0,1450	0,2932
Muslim/Poorest	0,0841	0,2266	0,0655	0,2034	0,1519	0,2987
Muslim/Poorer	0,0836	0,2339	0,0664	0,2044	0,1556	0,3052
Muslim/Richer	0,0813	0,2291	0,0592	0,2019	0,1440	0,2988
Muslim/Richest	0,0633	0,2135	0,0442	0,1768	0,1103	0,2760
No religion/Middle	0,0572	0,1907	0,0449	0,1521	0,1020	0,2390
No religion/Poorest	0,0603	0,1887	0,0383	0,1620	0,1019	0,2480

No religion/Poorer	0,0754	0,2239	0,0302	0,1456	0,1060	0,2649
No religion/Richer	0,0560	0,1934	0,0290	0,1416	0,0872	0,2371
No religion/Richest	0,0440	0,1717	0,0379	0,1788	0,0916	0,2603
Traditional Animist/Middle	0,0709	0,2151	0,0532	0,1957	0,1286	0,2859
Traditional Animist/Poorest	0,0876	0,2276	0,0623	0,1982	0,1579	0,2959
Traditional Animist/Poorer	0,0865	0,2377	0,0522	0,1854	0,1416	0,2924
Traditional Animist/Richer	0,0628	0,2033	0,0625	0,2046	0,1272	0,2842
Traditional Animist/Richest	0,0720	0,2091	0,0638	0,1982	0,1358	0,2715
Other Christian/Middle	0,0634	0,2032	0,0482	0,1860	0,1147	0,2737
Other Christian/Poorest	0,0769	0,2207	0,0495	0,1807	0,1298	0,2827
Other Christian/Poorer	0,0677	0,2007	0,0416	0,1629	0,1124	0,2575
Other Christian/Richer	0,0621	0,2002	0,0368	0,1581	0,1000	0,2514
Other Christian/Richest	0,0537	0,2065	0,0267	0,1427	0,0821	0,2503
Other/Middle	0,0507	0,1727	0,0464	0,1854	0,0971	0,2478
Other/Poorest	0,0923	0,2239	0,0506	0,1690	0,1466	0,3010
Other/Poorer	0,0846	0,2242	0,0568	0,1745	0,1452	0,2879
Other/Richer	0,0288	0,1268	0,0320	0,1322	0,0608	0,1803
Other/Richest	0,0324	0,1556	0,0022	0,0330	0,0368	0,1615
Missing/Middle	0,0729	0,2270	0,0625	0,1689	0,1354	0,2656
Missing/Poorest	0,0263	0,1147	0,0000	0,0000	0,0439	0,1343
Missing/Poorer	0,0486	0,1665	0,0000	0,0000	0,0486	0,1665
Missing/Richer	0,0000	0,0000	0,0147	0,0857	0,0147	0,0857
Missing/Richest	0,0208	0,1443	0,0104	0,0722	0,0313	0,1600
Total	0,0648	0,2057	0,0439	0,1718	0,1119	0,2664
Religion4*Country						
Christian/Madagascar	0,0439	0,1690	0,0235	0,1254	0,0705	0,2145
Christian/Burkina Faso	0,0629	0,1981	0,0511	0,1857	0,1182	0,2704
Christian/ Benin	0,0626	0,2010	0,0550	0,1914	0,1224	0,2775
Christian/Ethiopia	0,0633	0,2046	0,0290	0,1363	0,0940	0,2449
Christian/Kenya	0,0580	0,2024	0,0235	0,1267	0,0833	0,2386
Christian/Malawi	0,0622	0,2015	0,0446	0,1758	0,1094	0,2642
Christian/Rwanda	0,0646	0,2018	0,0425	0,1653	0,1102	0,2582
Christian/Sierra Leone	0,0955	0,2580	0,0383	0,1677	0,1362	0,3053
Christian/Zimbabwe	0,0329	0,1575	0,0133	0,1052	0,0485	0,1930
No Christian/ Madagascar	0,0589	0,1895	0,0274	0,1291	0,0882	0,2325
No Christian/ Burkina Faso	0,0761	0,2206	0,0745	0,2190	0,1545	0,3035
No Christian/ Benin	0,0730	0,2137	0,0601	0,2003	0,1380	0,2883
No Christian/Ethiopia	0,0737	0,2104	0,0440	0,1602	0,1206	0,2634
No Christian/Kenya	0,0602	0,2037	0,0265	0,1346	0,0887	0,2453
No Christian/Malawi	0,0751	0,2236	0,0482	0,1812	0,1250	0,2815
No Christian/Rwanda	0,0784	0,2385	0,0466	0,1641	0,1280	0,2884
No Christian/Sierra Leone	0,1078	0,2684	0,0567	0,1997	0,1686	0,3275
No Christian/ Zimbabwe	0,0339	0,1476	0,0231	0,1406	0,0585	0,2050
Missing/Madagascar	0,0164	0,1280	0,0082	0,0640	0,0246	0,1422
Missing/Burkina Faso	0,0286	0,1245	0,0313	0,1230	0,0703	0,1760

Missing/ Benin	0,0455	0,2132	0,0227	0,1066	0,0682	0,2338
Missing/Ethiopia	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Missing/Kenya	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Missing/Malawi	0,0000	0,0000	0,0625	0,1768	0,0625	0,1768
Missing/Rwanda	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Missing/Sierra Leone	0,1154	0,2193	0,0000	0,0000	0,1154	0,2193
Missing/Zimbabwe	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0,0648	0,2057	0,0439	0,1718	0,1119	0,2664

Source: Based on the datasets provided by the DHS program (DHS, 2015m, n, o, p, q, r, s, t, u).

A.3 Presentation of the Selected Variables

In this section, I will discuss some of the modifications I did to the original variables in order to obtain the variables presented in tables 8 and 9.

- ***Proportion dead infants, proportion dead children*** and ***proportion under five***
  My original dataset contained information concerning the number of children that each woman in my dataset had, as well as information concerning whether this child was dead or, alive and, if it was dead, its age when it died. The age at death was presented in months, and by using this information I calculated the number of dead children under five years old (age at death ≤ 60 months) for every woman in my dataset, while I did the same for the number of infants (age at death < 12 months) and children aged 1-4 (12months ≤ age at death < 60months). Then, and in order to find the proportion of dead infants I divided the number of dead infants a woman had during my period of interest with the number of singletons that she had during the same period. The exact same steps were followed in order to obtain the proportion of dead children and dead under-five for each woman in my dataset.

- ***Husband or, partner's educational level***
  The original variable consisted of five categories. In my study I kept the first three categories as they were and I merged together the last two in order to obtain the category *"Don't know/ Missing"* presented in table 9.

- ***Currently married***
  The original variable consisted of seven categories which were further transformed in order to obtain the categories presented in table 9. Thus, the category *"Married"* was kept as it was, while the category *"No"* refers to all these women who were not married at the time of the survey. This includes, among others, those never in union, those widowed, separated, or, those that were cohabitating.

- ***Husband or, partner's occupation*** and ***Respondent's occupation***
  The original variable consisted of 13 categories. In order to divide among blue collar and white or, pink collar workers, i generated a variable taking the value zero if the individual under question (the husband in this case) had either a manual work (skilled or, unskilled) or, worked in agriculture (both employees and self-employed were included) or any other household or domestic position. This category was named *"Blue collar"* and represented all the blue collar workers.

For the white, or, pink collar workers on the other hand, I made a category which included all those who worked in services, sales or, they generally had an "office position".
Finally, all other categories that could not be categorized as blue or, white/pink collar jobs were included in the *"No Occupation/Other/Missing"* category.
The exact same procedure was followed in the case of *Respondent's occupation* with the only exception being the fact that a new category was added referring to those women who were not working.

- ***Smoking***
  In order to generate this variable I combined eight variables from my original sample. The variables were the following: *Smokes cigarettes*, *Smokes pipe*, *Uses chewing tobacco*, *Uses snuff*, *Smokes cigars*, *Smokes: country specific*, *Smokes other* and *Does not use tobacco*.
  Then, I generated a new variable with nine categories, one for each of the variables described above, as well as a *"Missing"* category. Finally, I merged together all the categories referring to smoking, and I kept the missing and the non-smoking ones as they were. This resulted in the categories presented in table 9.

- ***Wife beating***
  In order to generate this variable I combined five variables from my original sample. The variables were the following: *Beating justified if wife goes out without telling husband*, *Beating justified if wife neglects the children*, *Beating justified if wife argues with husband*, *Beating justified if wife refuses to have sex with husband and Beating justified if wife burns the food.* All these variables had four categories *"Yes", "No', "Don't know" and "Missing"*. In order to proceed with my analysis, I generated a new variable taking the value of one if the individual under question replied that beating was justified in at least one case of the five mentioned above. The remaining individuals were categorized accordingly in the categories *"No"* and *"Don't know/Missing".*

- ***Opinion importance***
  This variable was the result of the combination of two variables from my original sample. In fact, in order to measure the importance of the individual's opinion I used the variables *"Respondent can refuse sex"* and *"Respondent can ask partner to use a condom"*. Next, I generated a new variable and I 'gathered' under the category *"Important"* all these women that answered "Yes" in both questions presented above. As in the previous case, the remaining individuals were categorized accordingly in the other categories presented in table 9.

- ***Toilet type*** and ***Drinking Source***
  Each of these variables in my original sample consisted of 17 categories. By using the information provided by Kenya's final report (KNBS & ICF Macro, 2010), I grouped these categories into the ones presented in table 9. It is worth mentioning that in terms of the *Toilet type* variable I also used information concerning whether the toilet facilities were shared with other households. If this was the case, then the toilet facility was, for hygienic

purposes, categorized as a *"Non-Improved"* one, even if it was for example a flush toilet piped to the sewer system.

- ***Time to get to water source***
  The original variable presented the time (in minutes) needed in order for the individual to get to the water source, while it also included several categories for those missing, the non-usual residents and those that had drinking water on premises. This variable was modified into the categorical one presented in table 9.

- ***Floor, Roof*** and ***Wall material***
  The variables in my original sample consisted of 14 categories for floor material, 18 for roof and 22 for the wall material. Again, by using the information provided by Kenya's final report (KNBS & ICF Macro, 2010), I grouped these categories into the ones presented in table 9.

- ***Age of household's head***
  The original variable contained information on the household head's age which ranged from 12 years to more than 97 years, while it also included two categories for "Don't know" and "Missing". This variable was further modified into the one presented in table 9.

- ***Religion variables and their modifications***
  Some problems were encountered with the religion variable, as the information was wrongly coded for several countries in my original dataset. In order to proceed with my analysis I used the information provided by the final reports for the nine countries under question and I generated a new variable for religion (for more information on each country's religion see Central Statistical Agency & ICF International, 2012; INSAE & Macro International Inc., 2007; INSD & ICF International, 2012; INSTAT & ICF Macro, 2010; KNBS & ICF Macro, 2010; NISR, MOH & ICF International, 2012; NSO & ICF Macro, 2011; SSL & ICF Macro, 2011; ZIMSTAT + ICF International, 2012).
  The new variable for religion consisted of 22 categories including, among others, several Protestant denominations which included a small number of observations and it was not easy to be examined as individual categories. Then, and having as a main axis this variable, I generated the religion variables presented in table 9.