

The Influence of Social Determinants on Health-Related Outcomes, Behaviors and Decision-Making in Four African Nations: A Demographic and Health Study

John Isaac Ph.D.^{1,2}

Calvin T Sung²

¹ School of Educational Studies, Claremont Graduate University, Claremont, California, USA

² School of Medicine, University of California Riverside, Riverside, California, USA

Abstract

Using Demographic and Health Surveys (DHS) administered in Angola, Chad, Ethiopia and Rwanda, this quantitative comparative study examines whether independent variables such as educational attainment, religion, wealth index, colonial history, and country significantly affected dependent variables of health-related decisions and outcomes such as termination of pregnancy and infant mortality. Literature will be utilized to discuss the effects of social and cultural forces as well as explore the educational opportunities, colonial history, and injustice associated with each nation. Each country's developmental index and gender equality rankings will be analyzed. The DHS data for each nation will be coded and analyzed separately using SPSS, and subsequently calculated by ANOVAs and logistic regressions to identify statistical significance. Putnam's Two-Level Game Theory and Social Capital Theory explains the complexities among the four nations. Results indicated that there was a statistically significant relationship between the independent variables and weighted infant mortality and termination of pregnancy.

Keywords: Health Determinants, Demographic and Health Surveys, Educational and Health, Religion and Health, Wealth and Health, Colonial History and Health, Social Capital

1. Introduction

The World Health Organization ranks nations based on the quality of their healthcare systems. While these data points help paint an overall picture of the status of each nation's healthcare environment, this study aims to investigate the variables that affect health-related decisions and well-being at the individual level. Educational attainment, religion, and socioeconomic status have all been studied in connection with preventable health disparities around the world (Thomas, DiClemente, & Snell, 2014). These quantitative variables are often referenced in the literature and by the World Health Organization as the social and educational determinants of health (Venkatapuram, 2010). In addition to education, religion and wealth there are also injustices that are perpetuated by societies through colonialism.

The Demographic and Health Survey (DHS) is administered in countries throughout the world and provides researchers with large datasets aimed at examining each nation's availability of health services and the utilization of those services by the population (Aitsi-Selmi, Bell, Shipley, & Marmot, 2014). The DHS, funded by the United States Agency for International Development, collects quantitative data on educational attainment, religious affiliation, and wealth index on various countries focused on health outcomes based on survey (Appendix: Demographic and Health Survey Questionnaire). By using the DHS data set, logistic regressions, descriptive and inferential statistics of ANOVA to examine whether there are relationships between independent and dependent variables, it may be possible to show a relationship between religious affiliation and health-related decisions and also examine the relationship between educational attainment and health outcomes. Since all of these items exist on the same data set, it will be possible to control for specific factors using Tukey post hoc tests following multiple ANOVAs in order to examine whether or not an individual variable influences the effects of others, such as the compound effects of wealth and educational attainment as opposed to wealth without educational attainment

The four nations that will be examined in this study are Angola, Chad, Ethiopia, and Rwanda. The countries were carefully selected in order to control for potential societal and cultural factors that could influence health outcomes. The study compared nations with majority of Muslim and Christian populations to examine whether there are differences in health outcomes and health-related decisions. With exception of Ethiopia, Angola (Portugal), Chad (France), and Rwanda (Belgium) were all colonized by European countries.

The purpose of this quantitative research study is to examine the relationship of variables such as education, religion, and wealth to health-related outcomes and decisions such as rates of infant mortality within first year of life and termination of pregnancy. Typically, when data is reported on populations within Africa, it rarely includes any statistical analysis of ethnicity, culture or religion (Cupito & Langsten, 2011). The significance of this study is two-fold. First, it is important to address a gap in the literature wherein the effects of education and religion on health outcomes are measured separately, especially in any country included in MENA (Middle East and North Africa) or Sub-Saharan Africa. The second area of significance is the examination of the relationship of specific cultures and religious backgrounds, defined by the DHS surveys as either Muslim, Christian, Animist, Traditional, no religion, or other (survey item 125 and demographic data), and the differences in education level and health outcomes and related decisions.

The findings in this study can help governments and researchers identify how specific cultures, religious backgrounds, and education levels contribute to differences in health outcomes, which would pave the way for helping communities improve health-related outcomes and concerns.

2. Literature Review of Independent Variables

The analysis will treat the effects of education, religion, and wealth on health outcomes as a public health issue. Fig. 1 depicts an overview of the life expectancy at birth, infant mortality rate per 1000, and the gross income per capita for each nation. The correlation between wealth and health has been well researched and will not be discussed in further details.

2.1 Education attainment and Health

Education has been mentioned throughout the centuries as a way to uphold the status quo and effectively perpetuate social norms (Harrington, 1989; Illich, 1974; Parenti, 2002). During the colonization of many African nations, the education system was frequently used to either create an elite class that was loyal to the ruling power or to subjugate the labor class (Segalla, 2012). This is a clear example of the difference between education and schooling that allowed the colonizing powers to develop a stratified society (Valenzuela, 1999). Stratification requires that certain members of society are highly educated, while other members are either moderately educated or not educated to the level of higher education (Grodsky & Jackson, 2009). Critical thinking skills in particular, through education as opposed to schooling, is essential for the evolution of healthcare practices and improvement of health outcomes by empowering individuals to break with tradition when it is in their best interest. Fig. 2 depicts the mean years of schooling, expected years of schooling, and expected increase of years in schooling for each country.

2.2 Religion and Health

In various regions in Africa, faith-based communities may not play a significant role in modern public health policy, but for centuries, religion, health, and medicine were closely connected through spiritual practices such as herbal medicine and spiritual healing (Asamoah-Gyadu, 2014). Religion is believed to influence health outcomes and health-related behaviors, leading researchers to propose a cognitive-behavioral framework to explain the relationship (Maltby, Lewis, Freeman, Day, Cruise, & Breslin, 2010). Regardless of whether the variables in Fig. 3 act independently of religion or whether there is an intrinsic quality which exists only in religion, according to the model, the variables that result from religious participation lead to better health.

Religion has been shown to help manage hypertension by reducing stress levels through spirituality and health practices such as diet and exercise (Naewbood, Sorajjakool, & Triamchaisri, 2012). In one study, members of the Seventh Day Adventist Church displayed higher levels of social connectedness, which in turn improved their overall sense of well-being (Fraser, Haller-Wade, & Morrow, 1997). The health effects of religion range from small dietary differences (Leung, 2013) to larger health outcomes such as diabetes and hypertension (Karlsen & Nazroo, 2010).

Philosophically, the idea that religion promotes the concept that all life has equal value, and therefore, that each individual has the right to quality healthcare may also lead to improved health outcomes for societies with strong religious foundations (Benn & Hyder, 2002). Fig. 4 provides an overview of the predominant religious practice of each country.

2.3 Colonialism and Health

Colonial powers may leave behind a legacy of structural violence that can lead to ongoing disparities in health, education, and socioeconomic status. This may vary based on the occupying power and the length of time a nation was colonized. Using their influence and authority, the dominant class may either convince or incentivize the subordinate class to share their point of view and share their values; this was described by Feinberg and Soltis (2004) as false consciousness. Brantlinger (2003) built on this concept of false consciousness to explain how the various groups within societies are co-opted in a quest to deny access to economic, health, and educational opportunities for traditionally underrepresented groups. School is one of those outlets, especially within the early schooling years (Fine, 1991). Canby (1994) noted that it can be difficult for an indigenous population to pass on its culture as well as way of life including healthcare practices from one generation to the next under the oppression of social forces. Fig. 3 provides an overview of the colonial background of each nation.

3. Literature Review: Education, Religion, Society, and Health of Each Country

This section will discuss the educational attainment, religion, colonization, history, and healthcare situations unique to each country.

3.1.1 Angola History and Wealth

During the early 20th century, Angola was officially designated as a colony by the Portuguese government (Keese, 2013). By the late 20th century, Angola had achieved independence from Portugal. After over 30 years of civil war that took over one million lives, Angola is positioned to make improvements and begin to utilize financial resources from both the oil and diamond industries to improve living conditions for its citizens. In 2002, the people and government of Angola began to rebuild a war-torn nation. Angola has a relatively strong GDP, yet a large percentage of Angolans live in poverty (Amundsen, 2014). Today, Angola's biggest trade partner is China, which often trades infrastructure projects for resources and boosting the economy (Habiyaemye, 2013). While the Angolan government remains hopeful, they are also wary of any situation that resembles the type of imperialism considering that large amounts of the wealth are still being concentrated by Angola's elite (Ovadia, 2012).

3.1.2 Angola Education

The education system in Angola mainly consists of poorly-funded government schools and educational opportunities provided by international NGOs and charity groups (Women's Commission for Refugee Women and Children, 1996). There is documented evidence that Christian charities in particular have provided education for both children and adults in Angola as early as the late 19th century (Samuels, 1967). Currently, there are efforts by NGOs, working alongside Angola's Ministry of Education, to improve teacher training, with specific aims of building up the education system in areas considered to be rural (Nsangengo & Diasala, 2008).

3.1.3. Angola Religion, Society, and Health

Child mortality rates and healthcare-seeking behaviors differ greatly for individuals who had undergone forced migration and those who did not migrate (Avogo & Agadjanian, 2010). Due to severe physician shortage, the Angolan healthcare system has relied heavily on nurses in order to provide health services (Costa, Marchi-Alves, Mazzo, Nogueira, Trevizan, Godoy, & Ventura, 2013). This has strained the healthcare system in a nation where chronic conditions such as hypertension remain an issue (Pires, Sebastião, Langa, & Nery, 2013). Having been colonized by Portugal, Angolans have had to adapt to Portuguese customs, oftentimes requiring an understanding of the Portuguese language, thereby making it difficult for large segments of the population to access healthcare services (Ferreira, 1973). Portuguese colonization and Christian missionaries also transformed Angola from a non-Christian nation to a predominantly-Christian country by the time it gained independence (Kananoja, 2010).

3.2.1 Chad History and Wealth

Efforts to build a functioning democracy in Chad have been met with challenges due to widespread insecurity (Miles, 1995). Three decades of civil war followed French colonization had displaced many Chadians and eroding social institutions (Fah, 2007).

The people of Chad have been living amongst the threat of violence and instability partly due to the influx of refugees from the Darfur crisis (Debos, 2011). The borders in the region known as Central Africa have historically been porous, since the days of French colonization (Vaughan, 2013). As a result of ongoing strife and political flux, it has been difficult for the Chadian government to improve social services in a nation still dealing with health issues such as polio (Leonard, 2011).

3.2.2 Chad Education

During French colonization, schools were few in number and received limited funding, a foundation which remains weak with regards to the modern Chadian education system (Gardinier, 1994). A number of schools are established by individuals or by international charities (French, 1996; Samway, 2012). During the period marked by civil war, the Chadian government spent eight times the amount of money on defense compared with the budgetary allocations reserved for education and healthcare (Tunteng, 1972).

3.2.3 Chad Religion, Society, and Health

Chadian society is influenced by Islam in the north, a majority of whom are Sufi, while the south is predominantly Christian (Ousman, 2004). Occasionally, the government in Chad places pressure on fundamentalist groups in the north, which, according to the literature, “only reminds us that there is not a single, monolithic version of Islam” (Ginsburg & Megahed, 2002, p. 293). During the Chadian civil wars, there was often conflict between the Muslim north and the Christian south (Saxena, 1982).

The lack of education opportunities in Chad has also affected the nation’s healthcare workforce, as many have left the country in recent years in search of proper education and training (Bloice & Hallinan, 2007). Despite international efforts, Chad’s healthcare system has been described as both weak and poor (Azétsop & Diop, 2013). As evidence, issues ranging from infertility to tuberculosis continue to challenge Chadians throughout the country (Ndeikoundam, Ngarhounoum, Ngangro, Rangar, Siriwardana, des Fontaines, & Chauvin, 2012; Leonard, 2002).

3.3.1 Angola History and Wealth

Ethiopia is the only independent nation in this study that successfully fought off European colonization efforts (Shilliam, 2013). An attempt to colonize Ethiopia was made in the 1930s by the Italian military; while Ethiopia was successful in fending off the attempt, the conflict left the nation’s social structure depleted and wounded (Triulzi, 2006). Ethiopian society would also face severe challenges as a result of a civil war and a costly conflict with neighboring Eritrea over a disputed border (Ali & Knife, 2012).

3.3.2 Angola Education

The Ethiopian government has made a recent push for primary education to be less teacher-oriented and more student-centered (Frost & Little, 2014). These new pedagogies are being developed through an increased commitment to teacher training, which Ethiopia also hopes will bridge regional and gender disparities (Semela, 2014). The Ethiopian government is also careful to preserve indigenous educational philosophy, which includes elements of spirituality and metaphysics, when possible during its modernization process (Girma, 2014). The education system has also sought to incorporate technology into classrooms in order to provide equitable opportunity in both urban and rural areas of the country (Abera, 2013). Higher education institutions remain underfunded (Tessema & Abebe, 2011). Recent empirical study showed that income was a positive determinant as to whether students receive a quality education in Ethiopia (Mani, Hoddinott, & Strauss, 2013).

3.3.3. Angola Religion, society, and health

Modern-day Ethiopian society consists of a Christian majority and a Muslim minority (Abbink, 2011). Efforts have been made by various factions to maintain peaceful relations between Ethiopia’s religious groups (Shetler & Yehualashet, 2013). The government and the church have long held a mutual respect, exemplified by the rule of Halie Salassie during the 20th century (Eyassu, 1998). Oftentimes, Ethiopians rely heavily on religious and spiritual leaders to help guide them through the challenging issues they face pertaining to health (Hannig, 2013). Efforts are underway, with the help of the World Health Organization, to bring about universal health coverage for the people of Ethiopia (Alebachew, Hatt, & Kukla, 2014). The WHO is also working with the Ethiopian government to expand access to mental health services as part of a global initiative (Abera, Tesfaye, Belachew, & Hanlon, 2014). As a result of perennially-high incidents of maternal death, Ethiopia has placed maternal health as a top priority in efforts to improve the national health system (Berhan & Berhan, 2014a).

3.4.1 Rawanda History and Wealth

The nation of Rwanda was colonized during the 20th century by Belgian forces (Vervust, 2012). The Belgians would soon favor the Rwandan ethnic group known as the Tutsi over the Hutu due to their lighter skin color and higher socioeconomic status within Rwandan society (Check, 2008). The Rwandan Revolution of 1959 led to independence in 1962 (Newbury, 1998). Women were generally relegated to roles in which they were to care for the household during the colonial period, and didn't begin to take on different roles until after the 1994 Rwandan genocide (Buscaglia & Randell, 2012). The Rwandan genocide resulted in the death of almost one million Tutsi and moderate Hutu at the hands of Hutu extremists after the Hutu president's plane was shot down in April of 1994 (Caplan, 2009). The Rwandan government is still struggling to create a political space wherein a solid democracy can flourish (Beswick, 2010).

3.4.2 Angola Education

At the time of independence in 1962, fewer than 100 Rwandans had received a post-secondary education (Duarte, 1995). While the lack of educational opportunities are cited as one of the causes of the conflict that ultimately led to the Rwandan genocide, expanded access to education is also viewed as a way to build a better society (McLean-Hilker, 2011). The Rwandan government is showing a commitment to modernizing the education system by allocating nearly a quarter of the federal budget to education (Bridgeland, Wulsin, & McNaught, 2009). Oftentimes international aid is focused on basic and remedial education, while the government of Rwanda is also concerned with higher levels of education training (Hayman, 2007).

3.4.3. Angola Religion, society, and health

The process of reconciliation after violent conflicts such as civil war or genocide can help prevent further violent attacks in the future (Staub, 2013). The Rwandan government is taking up a number of initiatives ranging from gender equality policies to increased access to healthcare (Debusscher & Ansoms, 2013; Hong, Ayad, & Ngabo, 2011). The medical community is also supportive of proposed reforms, with many physicians committing personally to rebuilding the healthcare system (Geltman, 1997). Mental health also looms across Rwanda, considering it has only been 20 years since the genocide of 1994 and issues such as post-traumatic stress disorder were never effectively treated (Munyandamutsa, Mahoro, Gex-Fabry, & Eytan, 2012). The Christian Church, the major religion in Rwanda, is also contributing to the cohesion of post-genocide Rwanda, welcoming refugees back into society and offering hope (Cantrell, 2014).

3.5 Human Development Index and Gender Development Index

By focusing on the equitable distribution of resources across a population, "progress" was defined by Edmonds (1979) decades ago to be that which allows vulnerable members of a society to become less vulnerable. In order to first develop a general understanding of where the four nations involved in this study rank in comparison to both one another and the rest of world, it is helpful to begin with the United Nations Human Development Index (HDI), which measures the amount of resources available to individuals in each nation and whether or not the resources are distributed evenly across the population (Zambrano, 2014). The UN has also developed the Gender Development Index (GDI), which mirrors the HDI rankings but disaggregates the data based on gender with regards to equity. As depicted in Fig. 6, subtracting the GDI from the HDI, one can gain a sense as to whether or not a nation provides fair opportunity for women.

4. Methodology

This study will empirically analyze the secondary data from the most recent Demographic and Health Survey questionnaires administered in Angola (2011), Chad (2004), Ethiopia (2011) and Rwanda (2010). Descriptive statistics was used to describe the samples and study the variables obtained within each nation. ANOVA was conducted to determine if the independent variables of educational attainment, religion, wealth index, and colonial history were significantly accounted for the variations in the continuous dependent variables of infant mortality at a significance level of .05 for all analyses. ANOVA also investigated interaction effects of each country with the other independent variables to determine whether the relationship of education, religion, colonial history, and wealth index to weighted infant mortality was significantly different among the four African nations. In instances wherein the ANOVA determined significant relationships (education, religion, country, and wealth index), a post hoc Tukey's test of multiple comparison was also conducted to further identify the relationships between independent and dependent variables.

A logistic regression analysis was performed to determine if educational attainment, religion, wealth index, and colonial history were significantly related to the categorical measured dependent variable pregnancy termination. It should be noted that Angola data only included infant mortality, thus Angola was not included in the logistic regression test.

4.1 Instrumentation

Data gathered from DHS will be classified based on educational attainment classifications, religious classifications, colonial history, country and wealth indices. The data gathered from the data source will be analyzed using SPSS v21.0 to prepare for data analyses. The coding and operationalization of the study variables are presented in Table 1.

4.2 Research Question and Hypothesis

Table 2 lists the research questions and their associated null and alternative hypothesis that will guide this study.

5. Results

Combining ANOVA and logistic regression results lead to the rejection of all 5 null hypothesis and demonstrated that there is a statistically significant relationship between all independent and dependent variables. However when separated, ANOVA results indicated colonialism does not significantly affect health relate outcome of infant mortality while logistic regression indicated that religion does not significantly relate to health-related decision of pregnancy termination.

5.1 Descriptive Data of Study Variables

Table 3 summarizes the unweighted sample data on educational attainment, religion, wealth index, colonial history, and termination of pregnancy among the four African nations of Angola, Chad, Ethiopia, and Rwanda and the descriptive statistics of infant mortality by country.

Table 4 summarizes the descriptive statistics of the household sample and weighted values of the infant mortality by country. The household weight for a particular household is the inverse of its household selection probability multiplied by the inverse of the household response rate of its household response rate group.

The most prevalent level of educational attainment in Angola and Rwanda was incomplete primary education, while results for Chad and Ethiopia showed that there was no dominant education for most respondents. According to Fig. 1 and Table 4, Angola had the greatest gross national income per capita at \$6323 and 61.2% of the respondents fell into the richer or richest category while Ethiopia had the lowest at \$1622 and 49.3%, respectively. Most respondents in each country noted that they had not experienced termination of pregnancy. In terms of infant mortality, Chad had the highest rate ($M = 0.71$), and Angola had the lowest ($M = 0.31$) The mean for infant mortality for all four country was less than one. According to Fig. 5, although Rwanda is second in terms of UN HDI rankings at 151 but leads in terms of UN GDI ranking at 80 and HDI-GDI difference at +71.

5.2 Levene's Test of Equality of Error Variance

Table 5 summarizes the results of the Levene's test of equality or homogeneity of variances. The result of the test showed that the variances of the health outcomes and health-related decision variable of weighted value of infant mortality ($F(399, 6622) = 40.21, p < 0.01$) was not homogeneous or equal across the different categories of the independent variable of educational attainment, religion, wealth index and colonial history.

5.3 ANOVA Results of Effects on Weighted Infant Mortality

According to Table 6, ANOVA results indicated that the weighted infant mortality health-related outcome was significantly different and distinct across the independent variables including religion ($F(6, 66555) = 3.16, p < 0.01$), education ($F(5, 66555) = 230.65, p < 0.01$), country ($F(3, 66555) = 9.10, p < 0.01$), and wealth index ($F(4, 566555) = 102.68, p < 0.01$). The results indicate that the number of infant mortality would significantly differ when there are differences in religion, education, country, and wealth index. The interaction effects of country with the independent variables of religion ($F(11, 66555) = 15.46, p < 0.01$), educational attainment ($F(20, 66555) = 24.97, p < 0.01$), and wealth index ($F(16, 66555) = 24.54, p < 0.01$) had a significant relationship to the weighted infant mortality health-related outcome variable. The results indicate that the relationships of education, religion and wealth index with health outcomes and the health-related decision variable of weighted infant mortality was significantly different among the four African nations

5.4 Post-hoc test of ANOVA by Research Question

A post-hoc test using the Tukey's statistics was conducted to further analyze the ANOVA result of the significant relationships of the health outcomes and health-related decision variable of weighted infant mortality with education, religion, country, and wealth index. This was investigated by determining the significant differences in the infant mortality.

5.4.1 Education and Infant Mortality

Table 7 summarizes the post-hoc test results of the data with a multiple comparison of the infant mortality according to the different educational attainment groups. Those with higher education level had lower infant mortality.

5.4.2 Religion and Infant Mortality

Table 8 summarizes the post-hoc test results of the data resulting from a multiple comparison of infant mortality according to the different religious groups. Christian groups showed slightly increased incidence of infant mortality compared with Muslim groups and have lower incidence of infant mortality than Animist. Muslim/Islam have lower incidence of infant mortality as compared to Animist, traditional religion, those with no religion, and with other religion group. Animist groups displayed greater incidence of infant mortality as compared to traditional religion, those with no religion, and with other religion group.

5.4.3 Wealth Index and Infant Mortality

Table 9 summarizes the post-hoc test results of the data with a multiple comparison of infant mortality according to the different wealth index levels. A higher or richer wealth index was associated with lower infant mortality.

5.4.4 Country and Infant Mortality

Table 10 summarizes the post-hoc test results of the data by conducting a multiple comparison of the weighted infant mortality by countries. Chad has significantly higher infant mortality than Ethiopia ($p < 0.01$, mean difference = 0.34), Rwanda ($p < 0.01$, mean difference = 0.43), Angola ($p < 0.01$, mean difference = 0.48). Angola has significantly lower infant mortality than Ethiopia ($p < 0.01$, mean difference = -0.15) and Rwanda ($p < 0.01$, mean difference = -0.05).

5.5 Logistic Regression Results of Effects on Termination of Pregnancy

The logistic regression analysis results indicated that termination of pregnancy was significantly affected by the difference in country, education, colonial history, and wealth index. Table 11 logistic regression analysis results showed that termination of pregnancy was significantly influenced or related by the independent variables of country (Wald (1) = 678.84, $p < 0.01$), education (Wald (1) = 67.48, $p < 0.01$), colonial history (Wald (1) = 103.58, $p < 0.01$), and wealth index (Wald (1) = 57.10, $p < 0.01$). The coefficient of the odds ratio statistics of Exp(B) of the significance independent variables was investigated to determine the difference in the log odds of the dependent variable of termination of pregnancy for a one unit increase in the values independent variables. The logistic regression model shows that the presence of a colonial history increased the odds of termination of pregnancy by 41% compared to being in a country without this history. A higher degree of educational attainment increased the odds of a termination of pregnancy by 6 percent. Having higher or richer wealth index decreased the odds of a termination of pregnancy by 6 percent. Angola was not included in this part of the study.

6. Discussion

Health is an important factor and healthcare is a major component of government services. In particular, wealth and educational attainment stood out as having the largest impact on health-related outcomes, behaviors and decisions. The analysis of the relationship between social variables and individuals' health outcomes and health-related decisions could pave the way for identifying ways to empower individuals in their decision making.

6.1 Putnam's Two-Level Game Theory and Social Capital Discussion

Putnam's Two-Level Game Theory and Social Capital Theory will be used in explaining the complexities among the four nations in this study, as well as factors that affect and explain the differences among these nations. The Two-Level Game Theory explains that there are two levels of interaction among players: international and domestic (Putnam, 1988). According to this theory, there is negotiation and discussion at the international level among different players such as various countries or individual organizations, depending on the situation. At the domestic level, the discussions initiated at the international level are discussed and voted on.

Due to these dynamics wherein the domestic and international discussions happen at the same time, each country is different as they have varying dynamics per level. Putnam also explains in his Social Capital Theory that social capital means “connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them (Putnam, p. 19, 2000).” He also distinguished between bonding and bridging social capital (Putnam, 2000). Bonding is a concept where people socialize with the same type of people (i.e., same age, religion, etc.), while bridging is when people interact with others who are not like them. This theory will also contribute in explaining the difference among nations. The theoretical concepts mentioned above could further explain the differences in the health outcomes and health-related.

6.2 Colonial History and Religion Discussion

While quantitative ANOVA and Logistic Regression results conducted within the limitation of this studies parameter indicated that colonial history and religion does not significantly relate to infant mortality and termination of pregnancy, further qualitative research may involve other theoretical approaches through the literature and history of each country to make better sense of the statistics.

For example, it is worth noting that some of the countries in this study have a history of strong civil and social foundations while others are still recovering from recent wars and genocide. Comparing two African nation's outcomes directly will not provide the same results with regards to the effects of colonization as when Ethiopia's outcomes were compared with nations that were both colonized and subsequently endured periods of civil war, such as Rwanda, Angola and Chad. Civil war and genocide act to magnify the effects of colonization which are reflected in the data. To fully measure the effects of colonization would require an examination of nations that were similarly positioned with regards to social and economic forces prior to colonization.

For example, the Rwandan genocide had lasting effects on Rwandan society and until today, tensions remain between different factions. Rwanda's population is also mostly Christian today, a result of colonization and missionary work conducted in Rwanda over the years. Rwanda's health outcomes are improving but the rebuilding process takes time. These are factors that provide limitations due to the fact that measuring the effects of educational attainment, religion and wealth cannot be controlled.

7. Conclusion

In conclusion, the study was able to identify the relationship between variables such as education, religion, wealth index, colonial history and country with individuals' health outcomes and health-related decisions (i.e. infant mortality and termination of pregnancy). Given that there is a gap in the literature on the study of these factors in relation to health outcomes, it is beneficial to understand and identify the relationships between these variables to further identify the factors that significantly affect health outcomes and decisions.

The lasting effects of colonization and assessment of other groups/countries is recommended in order to address generalizability and merits further research. The hope is that these findings would lead to further studies that would potentially help define the various communities as significantly distinct cultures with specific health needs, and not merely subgroups within homogenous nations who simply choose to practice a different religion than the majority. The findings in this study can help governments and researchers identify how specific cultures, religious backgrounds, and education levels contribute to differences in health outcomes, which would pave the way for helping communities improve health-related outcomes and concerns.

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Figures:

Figure 1

Life expectancy, infant mortality, and gross national income

Nation	Life expectancy at birth	Infant mortality rate per 1000	Gross national income per capita
Angola	51.9	100	6,323
Rwanda	64.1	39	1,403
Ethiopia	63.6	47	1,303
Chad	51.2	89	1,622

Figure 2

Years of schooling

Nation	Mean years of schooling	Expected years of schooling	Expected increase
Angola	4.7	11.4	7.0
Rwanda	3.3	13.2	9.9
Ethiopia	2.4	8.5	6.1
Chad	1.5	7.4	5.9

Figure 3

Colonial history and national religion(s)

Nation	Colonial history	Predominant religion(s)
Angola	Portuguese	Christianity
Chad	French	Islam (majority) Christianity (minority)
Ethiopia	N/A	Christianity (majority) Islam (minority)
Rwanda	Belgian	Christianity

Figure 4

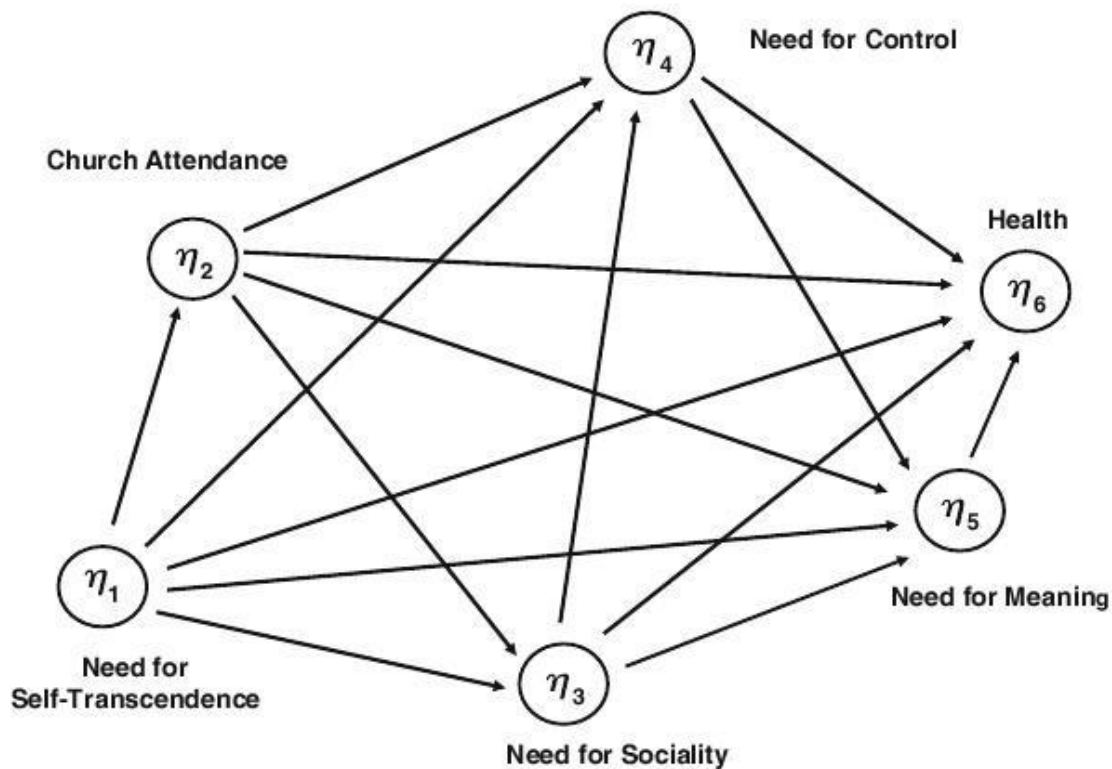
Krause's (2011) depiction of the needs met by religion

Figure 5

Krause's (2011) depiction of the needs met by religion

Nation	UN HDI Rank	UN GDI Rank	HDI-GDI
Angola	149	N/A	N/A
Rwanda	151	80	+71
Ethiopia	173	126	+47
Chad	184	144	+40

Tables:

Table 1

Operationalization and Coding of Study Variables

Variable name	Variable type	Operationalization	Coding/values
Colonial history	Independent variable	Categorical	0 = Not colonized 1 = Colonized
Religion	Independent variable	Categorical	0 = None 1 = Christian 2 = Muslim 3 = Animist 4 = Traditional 5 = No religion 6 = Other
Educational attainment	Independent variable	Categorical	0 = No education 1 = Incomplete primary 2 = Complete primary 3 = Incomplete secondary 4 = Complete secondary 5 = Higher
Wealth index	Independent variable	Categorical	1 = Poorest 2 = Poorer 3 = Middle 4 = Richer 5 = Richest
Country	Independent variable	Categorical	Angola Chad Ethiopia Rwanda 0 = No
Termination of pregnancy	Dependent variable	Categorical	1 = Yes
Infant mortality	Dependent variable	Continuous	Actual number of infant deaths

Table 2

Research Questions, Null Hypothesis, Alternative Hypothesis

Research Questions	Null Hypothesis	Hypothesis
RQ1: What is the relationship of educational attainment to health outcomes and health-related decisions (i.e. infant mortality and termination of pregnancy)?	H ₀₁ : Educational attainment is not significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)	H ₁ : Educational attainment is significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)
RQ2: What is the relationship of religion to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)?	H ₀₂ : Religion is not significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)	H ₂ : Religion is significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)
RQ3: What is the relationship of wealth index to health outcomes and health-related decisions (i.e., infant mortality, and termination of pregnancy)?	H ₀₃ : Wealth index is not significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)	H ₃ : Wealth index is significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)
RQ4: What is the relationship of colonial history to health outcomes and health-related decisions (i.e. infant mortality, and termination of pregnancy)?	H ₀₄ : Colonial history is not significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)	H ₄ : Colonial history is significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)
RQ5: What is the relationship of country to health outcomes and health-related decisions (i.e. infant mortality, and termination of pregnancy)?	H ₀₅ : Country is not significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)	H ₅ : Country is significantly related to health outcomes and health-related decisions (i.e., infant mortality and termination of pregnancy)

Table 3

Unweighted Sample Frequency Summaries of Colonial History, Religion, Educational Attainment, Wealth Index, and Termination of Pregnancy by Country and Unweighted Sample Statistics of Infant Mortality by Country

		Country									
		Angola		Chad		Ethiopia		Rwanda		Total	
		n	%	n	%	n	%	n	%	n	%
Colonial history	0 Not colonized	0	0.00%	0	0.00%	16515	100.00%	0	0.00%	16515	36.81%
	1 Colonized	8589	100.00%	6085	100.00%	0	0.00%	13671	100.00%	28345	63.19%
	Total	8589		6085	100.00%	16515		13671		44860	100.00%
	None	0	0.00%	0	0.00%	0	0.00%	0	0.00%	6	0.00%
Religion	1.0 Christian	7727	90.00%	1779	3.90%	10108	61.20%	13232	96.80%	32846	73.22%
	2.0 Muslim	23	0.30%	4098	96.00%	6170	37.40%	197	1.40%	10488	23.38%
	3.0 Animist	0	0.00%	56	0.00%	0	0.00%	0	0.00%	56	0.12%
	4.0 Traditional	21	0.20%	0	0.00%	93	0.60%	0	0.00%	114	0.25%
	5.0 No religion	466	5.40%	139	0.00%	0	0.00%	91	0.70%	696	1.55%
	96.0 Other	352	4.10%	13	0.10%	144	0.90%	151	1.10%	660	1.47%
	Total	8589	100.00%	6085	100.00%	16515	100.00%	13671	100.00%	44860	100.00%
	0 No education	2126	24.80%	4262	22.30%	8278	50.10%	2061	15.10%	16727	37.29%
	1.0 Incomplete primary	4594	53.50%	958	5.70%	5184	31.40%	7389	54.00%	18125	40.40%
	2.0 Complete primary	238	2.80%	154	4.30%	674	4.10%	1888	13.80%	2954	6.58%
Educational attainment	3.0 Incomplete secondary	778	9.10%	596	13.50%	1100	6.70%	1681	12.30%	4155	9.26%
	4.0 Complete secondary	566	6.60%	53	39.50%	295	1.80%	409	3.00%	1323	2.94%
	5.0 Higher	287	3.30%	62	14.70%	984	6.00%	243	1.80%	1576	3.51%
	Total	8589	100.00%	6085	100.00%	16515	100.00%	13671	100.00%	44860	100.00%
	1.0 Poorest	1068	12.4%	1107	18.2%	3711	34.09%	2569	24.57%	8455	18.85%
	2.0 Poorer	963	11.2%	873	14.3%	2402	22.07%	2603	24.89%	6841	15.25%
Wealth index	3.0 Middle	1299	15.1%	748	12.3%	2268	20.83%	2663	25.47%	6978	15.56%
	4.0 Richer	2558	29.8%	1003	16.5%	2505	23.01%	2621	25.07%	8687	19.36%
	5.0 Richest	2701	31.4%	2354	38.7%	5629	34.1%	3215	23.5%	13899	30.98%
	Total	8589	100.0%	6085	100.0%	16515	100.0%	13671	100.0%	44860	100.0%
	No			5320	78.40%	15079	91.30%	12734	93.10%	33133	91.35%
	Yes			752	21.60%	1428	8.60%	937	6.90%	3117	8.590%
Termination of pregnancy	Missing			13	0.00%	8	0.00%	0	0.00%	21	0.06%
	Total			6085	100.00%	16515	100.00%	13671	100.00%	36271	100.00%
Country	Mean of infant mortality	N	Std. Deviation	Minimu m	Maximu m						
Angola	0.31	8589	0.81	0	11						
Chad	0.71	6085	1.2	0	9						
Ethiopia	0.45	16515	1	0	15						
Rwanda	0.36	13671	0.84	0	10						
Total	0.46	44860	0.87	0	15						

Table 4
Descriptive Statistics of Household Sample Weights and Weighted Infant Mortality by Countries

		Weights	Weighted infant mortality
Angola	Mean	1	0.31
	N	8589	8589
	Std. deviation	0.39	0.9
	Minimum	0.18	0
	Maximum	1.98	15.06
Chad	Mean	1	0.8
	N	6085	6085
	Std. deviation	0.8	1.84
	Minimum	0.09	0
	Maximum	4.12	24.39
Ethiopia	Mean	1	0.13
	N	21762	21762
	Std. deviation	1.09	1.47
	Minimum	0.01	0
	Maximum	8.22	21.15
Rwanda	Mean	1	0.37
	N	13671	13671
	Std. deviation	0.21	0.88
	Minimum	0.36	0
	Maximum	2.1	9.53
Total	Mean	1	0.34
	N	41518	41518
	Std. deviation	0.72	1.11
	Minimum	0.01	0
	Maximum	8.22	24.39

b. Dependent Variable: Weighted Infant mortality

Table 5
Levene's Test of Equality of Error Variances

F	df1	df2	Sig.
40.21	399	66222	<0.01

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Country + Colonial history + Religion + Educational attainment + Wealth index + Country * Colonial history + Country * Religion + Country * Educational attainment + Country * Wealth index

Table 6

ANOVA Tests of Between-Subjects Effects of Country, Colonial History, Religion, Educational Attainment, and Wealth Index on Weighted Infant Mortality

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	7192.48	66	108.98	97.20	<0.01*
Intercept	50.23	1	50.23	44.80	<0.01*
Country	30.62	3	10.21	9.10	<0.01*
Colonial history	0.00	0	.	.	<0.01*
Religion	21.26	6	3.54	3.16	<0.01*
Educational attainment	1293.03	5	258.61	230.65	<0.01*
Wealth index	460.50	4	115.12	102.68	<0.01*
Country * Colonial history	0.00	0	.	.	<0.01*
Country * Religion	190.71	11	17.34	15.46	<0.01*
Country * Educational attainment	559.96	20	28.00	24.97	<0.01*
Country * Wealth index	440.17	16	27.51	24.54	<0.01*
Error	74621.76	66555	1.12		
Total	89658.81	66622			
Corrected total	81814.24	66621			

a. R Squared = 0.11 (Adjusted R Squared = 0.11)

Dependent variable: Weighted infant mortality

*Significantly different at level of significance of 0.05

Table 7

Tukey's Post-hoc Tests of Difference of Weighted Infant Mortality by Educational Attainment

(I) Educational attainment	(J) Educational attainment	Mean difference(I-J)	Std. error	Sig.
0 No education	1.0 Incomplete primary	0.35*	0.01	<0.01
	2.0 Complete primary	0.47*	0.02	<0.01
	3.0 Incomplete secondary	0.57*	0.01	<0.01
	4.0 Complete secondary	0.59*	0.01	<0.01
	5.0 Higher	0.63*	0.02	<0.01
1.0 Incomplete primary	2.0 Complete primary	0.12*	0.02	<0.01
	3.0 Incomplete secondary	0.22*	0.01	<0.01
	4.0 Complete secondary	0.24*	0.01	<0.01
	5.0 Higher	0.28*	0.02	<0.01
2.0 Complete primary	3.0 Incomplete secondary	0.10*	0.02	<0.01
	4.0 Complete secondary	0.12*	0.02	<0.01
	5.0 Higher	0.15*	0.02	<0.01
3.0 Incomplete secondary	5.0 Higher	0.06*	0.02	0.05

Based on observed means. The error term is Mean Square (Error) = 1.121. *. The mean difference is significant at the level of significance of 0.05

Table 8

Tukey's Post-hoc Tests of Difference of Weighted Infant Mortality by Religion

(I) Religion	(J) Religion	Mean difference (I-J)	Std. error	Sig.
1.0 Christian	2.0 Muslim/Islam	0.17 [*]	0.01	<0.01
	3.0 Animist	-0.92 [*]	0.14	<0.01
2.0 Muslim/Islam	3.0 Animist	-1.09 [*]	0.14	<0.01
	4.0 Traditional Religion	-0.37 [*]	0.10	<0.01
	5.0 No religion	-0.22 [*]	0.04	<0.01
	96.0 Other	-0.14 [*]	0.04	0.02
3.0 Animist	4.0 Traditional Religion	0.72 [*]	0.17	<0.00
	5.0 No religion	0.87 [*]	0.15	<0.01
	96.0 Other	0.96 [*]	0.15	<0.01

Based on observed means. The error term is Mean Square (Error) = 1.12. *. The mean difference is significant at the level of significance of 0.05

Table 9

Tukey's Post-hoc Tests of Difference of Weighted Infant Mortality by Wealth Index

(I) Wealth index	(J) Wealth index	Mean difference (I-J)	Std. error	Sig.
1.0 Poorest	2.0 Poorer	-0.06 [*]	0.01	<0.01
	4.0 Richer	0.05 [*]	0.01	<0.01
	5.0 Richest	0.27 [*]	0.01	<0.01
2.0 Poorer	3.0 Middle	0.06 [*]	0.01	<0.01
	4.0 Richer	0.11 [*]	0.01	<0.01
	5.0 Richest	0.33 [*]	0.01	<0.01
3.0 Middle	4.0 Richer	0.05 [*]	0.01	0.01
	5.0 Richest	0.27 [*]	0.01	<0.01
4.0 Richer	5.0 Richest	0.22 [*]	0.01	<0.01

Based on observed means.

The error term is Mean Square (Error) = 1.12.

*. The mean difference is significant at the level of significance of 0.05

Table 10

Tukey's Post-hoc Tests of Difference of Weighted Infant Mortality by Country

(I) Country	(J) Country	Mean Difference (I-J)	Std. Error	Sig.
1.0 Angola	2.0 Chad	-0.48 [*]	0.02	<0.01
	3.0 Ethiopia	-0.15 [*]	0.01	<0.01
	4.0 Rwanda	-0.05 [*]	0.01	<0.01
2.0 Chad	3.0 Ethiopia	0.34 [*]	0.02	<0.01
	4.0 Rwanda	0.43 [*]	0.02	<0.01
3.0 Ethiopia	4.0 Rwanda	0.09 [*]	0.01	<0.01

Based on observed means. The error term is Mean Square (Error) = 1.21.

Table 11

Logistic Regression Results of Effects of Country, Colonial History, Religion, Educational Attainment, and Wealth Index on Termination of Pregnancy

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Country	-0.37	0.01	678.84	1	<0.01 [*]	0.70
	Colonial history	0.35	0.03	103.58	1	<0.01 [*]	1.41
	Religion	0.00	0.00	0.12	1	0.73	1.00
	Educational attainment	0.06	0.01	67.48	1	<0.01 [*]	1.06
	Wealth index	-0.07	0.01	57.10	1	<0.01 [*]	0.94
	Constant	-0.75	0.07	117.14	1	<0.01 [*]	0.47

a. Variable(s) entered on step 1: Country, Colonial history, Religion, Educational attainment, Wealth index.

^{*}Significant at level of significance of 0.05

Appendix: Demographic and Health Survey Questionnaire Questions Relevant to Study Variables

104	Have you ever attended school?	YES 1 NO 2	→ 108
105	What is the highest level of school you attended: primary, secondary, or higher? (1)	PRIMARY 1 SECONDARY 2 HIGHER 3	
106	What is the highest (grade/form/year) you completed at that level? (1) IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE/FORM/YEAR <input type="text"/> <input type="text"/>	
107	CHECK 105: PRIMARY <input type="checkbox"/> SECONDARY OR HIGHER <input type="checkbox"/>		→ 110

230	Have you ever had a pregnancy that miscarried, was aborted, or ended in a stillbirth?	YES 1 NO 2	→ 238
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211 Now I would like to record the names of all your births, whether still alive or not, starting with the first one you had. RECORD NAMES OF ALL THE BIRTHS IN 212. RECORD TWINS AND TRIPLETS ON SEPARATE ROWS. (IF THERE ARE MORE THAN 12 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE, STARTING WITH THE SECOND ROW).									
212	213	214	215	216	217	218	219	220	221
What name was given to your (firstborn) baby? RECORD NAME BIRTH HISTORY NUMBER	Is (NAME) a boy or a girl? BOY 1 GIRL 2	Were any of these births twins? SING 1 MULT 2	In what month and year was (NAME) born? PROBE: When is his/her birthday? MONTH <input type="text"/> <input type="text"/> YEAR <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Is (NAME) still alive? YES ... 1 NO ... 2 ↓ 220	How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS AGE IN YEARS <input type="text"/> <input type="text"/>	Is (NAME) living with you? YES ... 1 NO ... 2	RECORD HOUSEHOLD LINE NUMBER OF CHILD (RECORD '00' IF CHILD NOT LISTED IN HOUSEHOLD). HOUSEHOLD LINE NUMBER <input type="text"/> <input type="text"/> (NEXT BIRTH)	How old was (NAME) when he/she died? IF '1 YR', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN TWO YEARS; OR YEARS. DAYS ... 1 <input type="text"/> <input type="text"/> MONTHS 2 <input type="text"/> <input type="text"/> YEARS ... 3 <input type="text"/> <input type="text"/>	Were there any other live births between (NAME OF PREVIOUS BIRTH) and (NAME), including any children who died after birth? YES ... 1 ADD ↗ BIRTH NO ... 2 NEXT ↘ BIRTH
01	BOY 1 GIRL 2	SING 1 MULT 2	MONTH <input type="text"/> <input type="text"/> YEAR <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	YES ... 1 NO ... 2 ↓ 220	AGE IN YEARS <input type="text"/> <input type="text"/>	YES ... 1 NO ... 2	HOUSEHOLD LINE NUMBER <input type="text"/> <input type="text"/> (NEXT BIRTH)	DAYS ... 1 <input type="text"/> <input type="text"/> MONTHS 2 <input type="text"/> <input type="text"/> YEARS ... 3 <input type="text"/> <input type="text"/>	
02	BOY 1 GIRL 2	SING 1 MULT 2	MONTH <input type="text"/> <input type="text"/> YEAR <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	YES ... 1 NO ... 2 ↓ 220	AGE IN YEARS <input type="text"/> <input type="text"/>	YES ... 1 NO ... 2	HOUSEHOLD LINE NUMBER <input type="text"/> <input type="text"/> (GO TO 221)	DAYS ... 1 <input type="text"/> <input type="text"/> MONTHS 2 <input type="text"/> <input type="text"/> YEARS ... 3 <input type="text"/> <input type="text"/>	YES ... 1 ADD ↗ BIRTH NO ... 2 NEXT ↘ BIRTH
03	BOY 1 GIRL 2	SING 1 MULT 2	MONTH <input type="text"/> <input type="text"/> YEAR <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	YES ... 1 NO ... 2 ↓ 220	AGE IN YEARS <input type="text"/> <input type="text"/>	YES ... 1 NO ... 2	HOUSEHOLD LINE NUMBER <input type="text"/> <input type="text"/> (GO TO 221)	DAYS ... 1 <input type="text"/> <input type="text"/> MONTHS 2 <input type="text"/> <input type="text"/> YEARS ... 3 <input type="text"/> <input type="text"/>	YES ... 1 ADD ↗ BIRTH NO ... 2 NEXT ↘ BIRTH

Note: Complete survey can be accessed at www.dhs.org