The Influence of Education, Religion, and Wealth on Health-Related Outcomes, Behaviors and Decision-Making in North Africa: A Demographic and Health Study

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Abstract

Using Demographic and Health Surveys (DHS) administered in Egypt, this quantitative comparative study examines whether independent variables such as educational attainment, religion, and wealth index significantly affected independent variables of health-related decisions and outcomes such as termination of pregnancy, blood pressure, and infant mortality. Literature will be utilized to discuss the political history, location, convergence of religion, and the Coptic ethnicity of Egypt in order to establish the existence of dichotomous cultural influences that will translate into a better understanding of the independent variables studied. Egypt's developmental index and gender equality rankings will also be analyzed. The DHS data for Egypt will be coded and analyzed separately using SPSS and subsequently calculated by ANOVAs and logistic regressions to identify statistical significance between the independent and dependent variables. Results indicated that there was a statistically significant relationship between lower education and wealth and increased infant mortality and termination of pregnancy.

Key Words: Health Determinants, Egypt Health, Demographic and Health Surveys, Education and Health, Religion and Health, Wealth and Health, Colonial History and Health

1. Introduction

Egypt is currently recognized by the United Nations to be a country located in North Africa. Numerous agencies also characterize Egypt as being part of the Middle East due to its geography and large Arab population. Christians constitute 10% of the population while members of the Islamic faith make up the other 90% (Rowe, 2001). The history of Egypt continues to influence the modern day makeup of Egyptian society. It is important to first discuss the vital convergence of religion, ethnicity, and colonial history in Egypt in order to establish the existence of various cultural influences that have persisted throughout recent history. Only then can other facets of Egyptian society, such as education, religion, social stratification, and public health begin to make sense.

This quantitative comparative study examines whether independent variables such as educational attainment, religion, wealth index, and colonial history are related to dependent variables of health outcomes and health-related decisions such as blood pressure, termination of pregnancy, and infant mortality. Secondary data from the Demographic and Health Survey (DHS) was utilized to analyze whether these demographic characteristics differentiate the health outcomes and health-related decision variables. The DHS is supported by the United States Agency for International Development (USAID) to collect data on topics to which few institutions would be able to gain access. Descriptive statistics and inferential statistics including Analysis of Variance (ANOVA) and logistic regression are used to examine the relationships.

2. Literature Review

This study will treat the social effects of education, religion, wealth, colonial and history on health outcomes as a public health issue.

2.1 Location of Egypt

Egypt is bordered to the north by the Mediterranean Sea and to the east by the Red Sea, making it an ideal passageway for commerce through the Suez Canal. Given its importance in ancient civilization and geographic location for trade, various cultures and ethnic groups either settled or temporarily occupied the area of land bordered by the Red and Mediterranean Seas (Armanious, 2010). In addition, the Nile River has provided a suitable environment for agriculture able to sustain large communities. The establishment of a rich trade culture in conjunction with the presence of fertile land has made Egypt a crossroads for multiple cultures. As a result, Egypt has been collectively influenced by African, European, and Arabic ways of life.

2.2 History, Colonialism, and the Society of Egypt

In the early 19th century, traditional Egyptian governance was replaced by a growing centralized state on multiple military, administrative, economic, and political levels (Dika, 1990). Muhammad Ali, a prominent Ottoman Albanian general, was the chief individual responsible for transforming Egypt. He established the first modern national army in the country (Al-Jabarti, 1882), eliminated the former ruling oligarchy, and confiscated the property of the old landholding classes. The religious class was made into pensioners of the government and the activities of the merchants and artisan groups were carefully monitored. Any type rebellion or dissent was also swiftly controlled by Ali's government. Notably, the transformation of Egypt began with integration into the world capitalism. Ultimately, Muhammad Ali turned Egypt from a predominantly agricultural society to an industrial driven economy.

One of the major changes during Ali's leadership was the privatization of lands. Lands were distributed to members of the royal family, notable village and regional leaders, and Turco-Circassian officials. Notably, Ali attempted to limit Turco-Circassian power by appointing Egyptian citizens as village headmen, who acted as agents of the state. This land privatization led to the rise of a new class of Egyptian nobles who subsequently held political influence as landowners. As part of the industrialization of Egypt under Ali, a professional military and bureaucracy were established. Egyptian citizens were sent to Europe to study and these individuals, once educated, returned to establish healthcare and educational infrastructure. Muhammad Ali's dynasty would last until the mid 20th century until the overthrow of the monarchy by Abdel Nasser.

In 1952, Abdel Nasser, an Egyptian military officer, successfully led a coup to overthrow the Egyptian monarchy that many Egyptians saw as responsible for the economic decline of Egypt and the subordination to British colonization. At the time, Egypt had a population of around 22 million (Goujon, Huda, Lutz, & Prommer, 2007; UN DESA). With the establishment of a new government with Nasser as its president, he nationalized the Suez Canal and paved the way for the construction of the Aswan High Dam. His reforms made him into a symbol of Arab nationalism. However, following Egypt's defeat in the Six-Day War in 1967, Nasser resigned from his office. This key event created public disillusionment with the promises of the Egyptian nationalism. Five years of inner turmoil followed, leaving the Egyptian government riddled with debt and frustration. The heavy burden of military expenditure and autocratic rule brought Egypt to near bankruptcy (Munro, 2000). With the rising debt faced by Egypt, healthcare and educational resources suffered.

The untimely death of Nasser in 1970 placed Anwar Sadat in the Presidential Palace. Reforms and liberalization paced steadily during Sadat's term as president. Egypt's population during this time rose steadily to 40 million (Goujon, Huda, Lutz, &Prommer, 2007; UN DESA). Sadat's government focused on turning Egypt away from its previous goals of leading the Arab world into a sterile structure of strict nationalistic socialism and implacable hostility towards the West. In 1973, after political relations of Egypt with the Soviet Union were dissolved, Sadat's government launched an attack on the Israeli forces who had occupied the Sinai Peninsula since 1967. This campaign was known as the October or Yom Kippur War. The success of the attack provided a boost in public morale, which gave Sadat power to work on his agenda of attaining peace for Egypt and re-engaging the U.S. (Munro, 2009).

One of Sadat's main goals was to employ a policy of economic and political pragmatism to achieve national recovery. A key objective of Sadat's government focused on the restoration of Egypt's relationship with the United States so that Egypt could potentially benefit from American aid. In 1978, Anwar El Sadat signed the Camp David Accords along with Israeli Prime Minister Menachem Begin, which promised peace between Egypt, Israel, and the United States with a long-term aid package included. Certain factions within Egypt and across the Middle East were opposed to the Accords causing Sadat's government to become quickly vilified. Egypt's diplomatic involvement with the West was seen as a betrayal by many and consequently led to the creation of extremist groups. Facing increasing internal uprising, Sadat was assassinated on October 6, 1981.

Following Sadat's death Husni Mubarak assumed the presidency after a successful referendum. He served as Egypt's president for more than 20 years, attempting to carry out the reforms started by his predecessor. The focus of Mubarak's term centered on liberalization and revitalized Egypt to a respectable modern Arab republic. The Gulf Crisis in 1990 and 1991 played a vital role in again placing Egypt at the center of Arab politics (Munro, 2000).

In 2011, Mubarak resigned and fled to Cairo following protests and civil disobedience. There were numerous allegations of abuse of power and corruption during his term that led to him stepping down from his presidency. Following his resignation, the military temporarily stepped in to control national affairs. Afterwards, the constitution and parliament of Egypt were abolished and a parliament election was called in September 2011. In November 2011, the first parliamentary election was held and a subsequent presidential election was held in 2012. Parliamentarian Mohammed Morsi campaigned as a candidate with the Muslim Brotherhood Party and defeated former Prime Minister Ahmed Shafik. During Morsi's term, he declared his decrees could not be challenged. This move led to various protests and culminated in violent action in Egypt. There were several coups attempted in 2013 with the Egyptian people demanding that Morsi step down from his presidency. General Abdul Fatah al-Sisi, the head of the Egyptian Armed Forces, declared the removal of Morsi from the presidency. He appointed Adly Mansour as acting president until elections were held. In 2014, General Abdul Fatah al-Sisi was elected as president.

2.3 Coptic Identity

Coptic Christians are currently the largest religious minority in Egypt and have faced increasing marginalization by the Egyptian government. Members of the Coptic Diaspora in Egypt have taken it upon themselves to make sure that the stories of their families back home are heard (Rowe, 2001). An important issue for many Coptic people is the task of maintaining a separate identity in Egypt, which has proven increasingly difficult with each passing generation (Zaborowski, 2008). A key aspect of Coptic identity to gradually disappear was the use of the Coptic language, which went from being widely used in Egypt to what is today a dead language that is only used in church services (Cochran, 2008).

Once the Coptic language was effectively no longer in use and replaced with Arabic, it became easier to unhinge other aspects of Coptic society and force Coptic communities to either conform to Arab norms or blend into society by adopting some form of cultural hybridity. In his seminal book, Watson (2000) observed the challenges faced by the Copts, utilizing the words of Cragg in saying that Christianity in the Middle East is "bound over to a language that is bound over to Islam," stressing the importance of language in maintaining culture and identity (p.10). The Coptic people had already become a minority in Egypt by the time it was colonized by Great Britain in 1882 (Searight, 1998). In 1952, a revolution occurred which ended Egypt's colonial history, installing Gamal Abdel-Nasser as its president (Page &Sonnenburg, 2003). This began Egypt's era of decolonization (Berque,

1972). Egypt would only see three presidents prior to the Tahrir Square protests that ousted President Hosni Mubarak in 2011 (El-Bendary, 2013). Three years before the revolution occurred, Cochran (2008) described the toxic set of circumstances faced by the people of Egypt as such:

President Muhammed Hosni Mubarak came to power in 1981 having no Vice President. His power has endured longer than all but two of the Pharaohs of ancient Egypt have. Under the stewardship of Hosni Mubarak, Egyptians have experienced little economic and educational change despite the political rhetoric. Individuals that have the opportunity for immigration leave for other countries, where they seek employment and a better life for their families. Meanwhile, Egypt's population and poverty continually increases. The average Egyptian family lives on approximately $140.00 a year and survives on government-subsidized housing, food, and transportation. (p. 1). The above passage provides support for the notion that a close examination of Egyptian society will reveal a distinct set of disparities. As mentioned previously, some members of Egypt's minority population, the Copts, trace their ancestry back to the ancient civilizations of Egypt. This leads many members of the Coptic community to assert that they are the indigenous people of Egypt, having held prominent positions in civil society until well into the reign of the Fatimid Period (Shenouda, 2007).

2.4 Injustice in Egypt

It is difficult for grassroots movements to gain momentum in de facto dictatorships such as the one that existed in Egypt, wherein discrimination is not only accepted within small social circles but also within the government controlled media (U.S. State Dept., 2007).

2.5 HDI and GDI of Egypt

United Nations Human Development Index (HDI) ranks nations based on a wide range of variables that include health, education, and socioeconomics. The HDI rankings were originally developed in 1990, and were updated in 2010 to measure the amount of resources available to individuals in each nation and whether or not the resources are distributed evenly across the population (Zambrano, 2014).

In addition to the Human Development Index, 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. By subtracting the GDI from the HDI, researchers can identify whether or not a nation provides fair opportunity for women.

According to the UN Human Development Index (Figure 1), Egypt ranks as 110th overall. However, Egypt ranks 125th in regards to the UN GDI rankings. A HDI-GDI of -15 indicates that that although it ranks higher than other nearby African Nations such as Chad (184) and Rwanda (151), there is less opportunity for women relative to the rank of the country.

2.6 Broad Statistics and Demographic and Health Survey (DHS)

According to the World Health Organization (WHO), Egypt has a 71.2-year life expectancy at birth, 18 infant mortality rate per 1000, and gross national income per capita of $10,400 USD. Egypt also has a mean of 6.4 years of schooling and an expected increase of 6.6 years of schooling for a child entering the education system today in comparison to an expected mean of 13.0 years. The World Health Organization also ranks nations based on the quality of their healthcare systems. Egypt has a global ranking of 63. 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.

This requires survey data in addition to broad statistics. The Demographic and Health Survey (DHS), funded by the USAID, collects data on various countries focused on health outcomes. The survey contains items that would be difficult to find elsewhere. For example, the Egyptian government tends to reveal as little information as possible about the Coptic population, a Christian minority group with a distinct culture and history. Studies on health disparities have shown that an individual's adherence to a particular religion can affect health outcomes (Koenig, 2009; McCullough et al., 2000). In addition, educational attainment has also been shown to affect health-related decisions (Chevalier & Feinstein, 2006). The DHS collects data on religious affiliation, wealth index, and educational attainment. In 2008, the demographic and health survey was administered to over 20,000 Egyptians, with the aim of measuring health outcomes.

3. Education, Religion, Wealth, and Health

Table 1 presents the unweighted sample frequency summaries of colonial history, religion, educational attainment, wealth index, and termination as well as the unweighted sample statistics of infant mortality of Egypt. Table 2 presents the descriptive statistics of household sample weights and weighted infant mortality of Egypt.

Table 1: Descriptive Statistics of Household Sample Weights and Weighted Infant Mortality

Religion	1.0 Christian	850	3.90%	
	2.0 Muslim	20887	96.00%	
	3.0 Animist	0	0.00%	
	4.0 Traditional	0	0.00%	
	5.0 No religion	0	0.00%	
	96.0 Other	19	0.10%	
	Total	21762	100.00%	
Educational attainment	0 No education	4861	22.30%	
	1.0 Incomplete primary	1239	5.70%	
	2.0 Complete primary	940	4.30%	
	3.0 Incomplete secondary	2935	13.50%	
	4.0 Complete secondary	8595	39.50%	
	5.0 Higher	3192	14.70%	
	Total	21762	100.00%	
Wealth index	1.0 Poorest	3960	18.20%	
	2.0 Poorer	4011	18.40%	
	3.0 Middle	4048	18.65	
	4.0 Richer	4482	20.60%	
	5.0 Richest	5261	24.20%	
	Total	21762	100.00%	
Termination of pregnancy	No	17071	78.40%	
	Yes	4691	21.60%	
	Missing	0	0.00%	
	Total	21762	100.00%	
Mean of infant mortality	N	Std. Deviation	Minimum	Maximum
0.12	21762	0.45	0	8

Table 2: Operationalization and Coding of Study Variables

Variable name	Variable type	Operationalization	Coding/values
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
Termination of pregnancy	Dependent variable	Categorical	0 = No
			1 = Yes
Infant mortality	Dependent variable	Continuous	Actual number of infant deaths
Blood pressure	Dependent variable	Continuous	Actual systolic blood pressure and diastolic blood pressure

3.1 Education in Egypt

Egypt's education system includes two public school systems and a large number of private schools. While it is important to point out the various modes of education that exist in Egypt, it is also worth mentioning that Egypt's public schools consist of a secular system and the Al Azhar system that has a religious focus. The Egyptian profile on the U.S. Department of Education's website states that:

"The curriculum is generally very similar in both educational systems with the exception of a stronger focus on religious studies in the Al Azhar system. Students are required to memorize twenty sections of the Holy Koran in primary school and the entire Holy Koran in preparatory school" (U.S. Dept. of Ed., 2006). This description states that the Al Azhar system has a stronger focus on religious studies than Egypt's public schools but otherwise both systems have a similar curriculum. The statement from the United States government agrees in part with the conclusion put forth by Neill (2006):

"During a five-month stay in Egypt, I interviewed students, teachers, and parents—both formally and informally. I also reviewed Arabic and social studies textbooks with the help of Arabic-speaking students to discover lesson content. These discussions plus the observation of Egyptian culture convinced me of the truth of my thesis, that education in Egypt is Islamic in character" (p. 482). Due in part to the efforts of Saint Habib Guirgis (recently canonized by the Coptic Orthodox Church), Egypt's public schools have allowed Christian students, mostly members of Egypt's Coptic community, to take courses on Christianity (Saad, 1998). Coptic individuals have historically placed a high emphasis on education; there is evidence that the earliest members of the church of Alexandria were teachers and their students (Wilson, 2003). Aiming to address the issues surrounding education, President Hosni Mubarak addressed the Egyptian education system in a 2004 speech, stating:

"The educational process is basically a social one. This requires promotion of private and non-profit sectors and the civil society's role in providing the infrastructure needed for education and its management within the framework that would realize national objectives and is subject to the uniform criteria of education in Egypt" (Mubarak, 2004). One study, aiming to capture the mentality that permeates the Egyptian educational, political, and public health systems recently measured Machiavellian tendencies in college students. This study showed that female students in Egypt showed a much higher tendency to do what it takes to succeed compared to their male counterparts in Western countries (Mostafa, 2007). The researchers concluded that this discrepancy occurs in Egypt due to the fact that women are often made to feel that they are not as qualified as men and as a result go to greater lengths to prove their ability.

The gender discrimination in Egyptian society have led some to call for a return to Ancient Egyptian principles known as the Ma'at, which were basic philosophies used during the time of the Pharaohs and are believed to form the foundation for an equal society (Hilliard, 1997). The Ma'at principles include: "truth, justice, harmony, balance, order, reciprocity, and righteousness" (Delpit& White-Bradley, 2003, p. 285). Furthermore, a recent research study conducted in Egypt petitioned the Egyptian government to adopt the following three principles, written from the students' perspectives and reading similar to an abbreviated Students' Bill of Rights:

1. We have a right to education to the highest degree.
2. We have a right to freedom of expression.
3. We have a right to avoid physical punishment. (Abdeen, p. 48, 2008)

3.2 Religion

Overall, Egypt is known as predominantly Arab, with only a small percentage of the population counted as being non-Arab (Armanious, 2010). In addition, the religious makeup of Egypt is approximately 90% Islamic (mostly Sunni) and 10% Christian (mostly Coptic Orthodox). Religion and politics are often intertwined in terms of influences. For example, the Coptic Orthodox Church has repeatedly called for national unity, even during the 2011 revolution that ousted President Mubarak (Guirguis, 2012). As a result, church hierarchy and influential members of the community have been criticized for not doing enough in giving an active voice to members of its community (Tadros, 2009).

3.3 Wealth Index and Health

Since Egypt's economy is set up in a way that leaves little room for a strong middle class, the country is left with a small but functioning upper class and a large lower class (Fahmy, 2012). Egypt developed a comprehensive public healthcare system in the 1980s to provide access to care for all Egyptians (Structure and Policies, 2014).
In addition to public resources, there are also private medical facilities for those who can afford the privilege. Despite the availability of public facilities, those of limited means are still expected to pay out-of-pocket fees depending on the type of service needed, which leads to inequities and health disparities in Egyptian society based on socioeconomic factors (Elgazzar, 2009). Egypt has also moved in recent years to strengthen and expand access for individuals seeking mental health services (Deshpande, Kaur, Zaky & Loza, 2013). In order to increase the utilization of mental health services, the Egyptian government needed to allocate resources towards reducing social stigma with regards to mental illness (Jenkins, Heshmat, Loza, Siekkonen & Sorour, 2010). Given the cost and often times inadequate resources, Egyptians can find it more convenient to access health services provided by their local church or mosque, especially in communities outside of the major city centers (Coker, 2008).

4. Methodology

Data gathered from DHS is classified based on educational attainment classifications, religious classifications, and wealth indices. The data gathered is analyzed using SPSS v21.0 to prepare for data analyses. The coding and operationalization of the study variables are presented in Table 1. By using the DHS data sets, it is possible to show a relationship between religious affiliation and health-related decisions and 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.

4.1 Research Question and Hypothesis

Table 3 lists the three research questions and their associated null and alternative hypothesis that will guide this study.

Table 3: Research Question, 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., blood pressure, infant mortality, and termination of pregnancy)?	H_{o1}: Educational attainment is not significantly related to health outcomes and health-related decisions (i.e., blood pressure, infant mortality and termination of pregnancy)	H_1: Educational attainment is significantly related to health outcomes and health-related decisions (i.e., blood pressure, infant mortality and termination of pregnancy)
RQ2: What is the relationship of religion to health outcomes and health-related decisions (i.e., blood pressure, infant mortality, and termination of pregnancy)?	H_{o2}: Religion is not significantly related to health outcomes and health-related decisions (i.e., blood pressure, infant mortality and termination of pregnancy)	H_2: Religion is significantly related to health outcomes and health-related decisions (i.e., blood pressure, infant mortality and termination of pregnancy)
RQ3: What is the relationship of wealth index to health outcomes and health-related decisions (i.e., blood pressure, infant mortality, and termination of pregnancy)?	H_{o3}: Wealth index is not significantly related to health outcomes and health-related decisions (i.e., blood pressure, infant mortality and termination of pregnancy)	H_3: Wealth index is significantly related to health outcomes and health-related decisions (i.e., blood pressure, infant mortality and termination of pregnancy)

4.1 ANOVA on Blood Pressure and Infant Mortality

Separate ANOVAs were conducted to determine whether the independent variables of education, religion, and wealth index were statically related to dependent variable such as the health outcomes of blood pressure and infant mortality. ANOVA also determined if the independent variables significantly accounted for the variations in the health outcome variable of infant mortality and blood pressure. A significance level of .05 was used for all analyses.

In instances where the ANOVA determined significant relationships between independent and dependent variables, a post hoc Tukey's test of multiple comparisons was also conducted to further identify the relationships between independent and dependent variables.

4.1 ANOVA on Religion and Infant Mortality

Various ANOVAs were performed to determine if religion was related to health outcomes and health-related decisions of blood pressure and weighted infant mortality. Unlike previous ANOVA calculations, this analysis only determined the individual relationship of religion with health outcomes. The earlier ANOVAs showed that religion was unrelated to health outcomes and health-related decision of blood pressure. The current ANOVAs seeks to demonstrate if religion was related to health outcomes and health-related decisions.

4.3 Logistic Regression on Termination of Pregnancy

A logistic regression analysis was performed to determine if educational attainment, religion, and wealth index were significantly related to the categorically measured health-related decision variable of termination of pregnancy. Termination of pregnancy is considered a categorized variable of dichotomous measured variable measured with the binary codes of 0 (no) and 1 (yes). A logistic regression is appropriate when the dependent variable is a binary variable. A level of significance of 0.05 was used.

5. Results

ANOVA determined that all of the independent variables tests were not significantly related with blood pressure. However, ANOVA showed that educational attainment and wealth index were significantly related with infant mortality. Logistic regression analysis showed that the termination of pregnancy was also significantly influenced by education and wealth.

5.1 ANOVA Blood Pressure

The ANOVA test results are presented in Tables 4 and 5. While none of the independent variables showed statistical significance at the .05 level, it is worth noting the effect of educational attainment on blood pressure showed a significance of .08 (systolic) and .17 (diastolic).

Table 4: ANOVA Tests of Between-Subjects Effects of Educational Attainment, Religion, and Wealth Index on Systolic Blood Pressure

Source	Dependent variable	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	Blood pressure systolic	46873.39	10	4687.34	1.28	0.23
Intercept	Blood pressure systolic	36322780.37	1	36322780.37	9947.90	<0.01*
Educational attainment	Blood pressure systolic	35886.62	5	7177.32	1.97	0.08
Wealth index	Blood pressure systolic	13814.84	4	3453.71	0.95	0.44
Religion	Blood pressure systolic	1887.26	1	1887.26	0.52	0.47
Error	Blood pressure systolic	43454158.81	11901	3651.30		
Total	Blood pressure systolic	234366589.00	11912			
Corrected total	Blood pressure systolic	43501032.20	11911			
a. R Squared = 0.00 (Adjusted R Squared = 0.00)						

*Significantly Different at level of significance of 0.05

Table 5: ANOVA Tests of Between-Subjects Effects of Educational Attainment, Religion, and Wealth Index on Diastolic Blood Pressure

Source	Dependent variable	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	Blood pressure diastolic	39973.38	10	3997.34	1.01	0.43
Intercept	Blood pressure diastolic	14839632.85	1	14839632.85	3752.12	<0.01*
Educational attainment	Blood pressure diastolic	30878.40	5	6175.68	1.56	0.17
Wealth index	Blood pressure diastolic	9282.00	4	2320.50	0.59	0.67
Religion	Blood pressure diastolic	1750.62	1	1750.62	0.44	0.51
Error	Blood pressure diastolic	47068428.32	11901	3955.00		
Total	Blood pressure diastolic	124345260.00	11912			
Corrected total	Blood pressure diastolic	47108401.70	11911			
a. R Squared = 0.00 (Adjusted R Squared = 0.00)						

*Significantly Different at level of significance of 0.05

5.2 ANOVA Tests of Between-Subjects Effects of Educational Attainment, Religion and Wealth Index on Weighted Infant Mortality for Egypt Data

The ANOVA in Table 6 shows that the health outcomes and health-related decision variable of the continuous measured of weighted infant mortality in Egypt was significantly different across each of the different categories of the independent variables of education ($F(5, 21749) = 4.30$, $p < 0.01$) and wealth index ($F(4, 21749) = 19.57$, $p < 0.01$). This indicates that the number of infant mortalities in Egypt would significantly differ when there are differences in educational attainment and wealth index among the samples in Egypt.

Table 6: ANOVA Tests of Between-Subjects Effects of Educational Attainment, Religion and Wealth Index on Weighted Infant Mortality for Egypt Data

Source	Type III sum of squares	df	Mean square	F	Sig.*
Corrected model	33.83	12	2.82	11.76	<0.01*
Intercept	2.36	1	2.36	9.85	<0.01*
Religion	0.34	3	0.11	0.47	0.71
Education	5.15	5	1.03	4.30	<0.00*
Wealth index	18.77	4	4.69	19.57	<0.00*
Error	5213.15	21749	0.24		
Total	6185.28	21762			
Corrected total	5246.98	21761			
a. R Squared = 0.01 (Adjusted R Squared = 0.01)					

*Significant at the level of significance of 0.05

5.3 Tukey's Statistics of Education and Wealth Index on Infant Mortality

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 infant mortality with education and wealth index.

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

Table 7 summarizes the post-hoc test results of the data regarding comparisons of infant mortality according to the different educational attainment levels. In regards to research question 1, it was determined that those with lower levels of education in Egypt have higher infant mortality rates than those with higher education levels.

Table 7: Tukey's Post-hoc Tests of Difference of Weighted Infant Mortality by Educational Attainment for Egypt Data

(I) Educational attainment	(J) Educational attainment	Mean difference (I-J)	Std. error	Sig.
0 No education	1 Incomplete primary	-0.05*	0.02	0.01
	4 Complete secondary	0.03*	0.01	0.05
	5 Higher	0.06*	0.01	<0.01
1 Incomplete primary	2 Complete primary	0.07*	0.02	<0.01
	3 Incomplete secondary	0.07*	0.02	<0.01
	4 Complete secondary	0.08*	0.01	<0.01
	5 Higher	0.11*	0.02	<0.01
3 Incomplete secondary	5 Higher	0.05*	0.01	<0.01
4 Complete secondary	5 Higher	0.04*	0.01	<0.01
Based on observed means.				
The error term is Mean Square (Error) = 0.24.				

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

Table 8 summarizes the post-hoc test results of the data in regards to infant mortality and according to the different wealth indices. In terms of research question 2, it was determined that higher wealth index in Egypt was associated with a lower number of infant mortality.

Table 8: 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 Poorest	4 Richer	0.04*	0.01	<0.01
	5 Richest	0.09*	0.01	<0.01
2 Poorer	4 Richer	0.04*	0.01	0.01
	5 Richest	0.08*	0.01	<0.01
3 Middle	4 Richer	0.05*	0.01	<0.01
	5 Richest	0.09*	0.01	<0.01
4 Richer	5 Richest	0.05*	0.01	<0.01

Based on observed means.

The error term is Mean Square (Error) = 0.24.

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

5.4 ANOVA Results of Effect of only Religion on Blood Pressure and Infant Mortality

The ANOVA test results on the effect of only Religion on Blood Pressure (Systolic Blood Pressure and Diastolic Blood Pressure) and Infant Mortality are presented in Tables 9 to 11, respectively. Religion was found to not significantly relate to blood pressure or infant mortality. These results indicate that the relationship of religion with termination of pregnancy and weighted infant mortality in the previous ANOVA test was not controlled by other demographic characteristics of education attainment and wealth index.

Table 9: ANOVA Tests of Between-Subjects Effect of Religion on Systolic Blood Pressure

Source	Dependent variable	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	Blood pressure systolic	2312.65	1	2312.65	0.63	0.43
Intercept	Blood pressure systolic	39753838.32	1	39753838.32	10884.65	<0.01*
Religion	Blood pressure systolic	2312.65	1	2312.65	0.63	0.43
Error	Blood pressure systolic	43498719.55	11910	3652.29		
Total	Blood pressure systolic	234366589.00	11912			
Corrected total	Blood pressure systolic	43501032.20	11911			
a. R Squared = 0.00 (Adjusted R Squared = 0.00)						

*Significantly Different at level of significance of 0.05

Table 10: ANOVA Tests of Between-Subjects Effect of Religion on Diastolic Blood Pressure

Source	Dependent variable	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	Blood pressure diastolic	2137.52	1	2137.52	0.54	0.46
Intercept	Blood pressure diastolic	16199076.21	1	16199076.21	4095.66	<0.01*
Religion	Blood pressure diastolic	2137.52	1	2137.52	0.54	0.46
Error	Blood pressure diastolic	47106264.17	11910	3955.19		
Total	Blood pressure diastolic	124345260.00	11912			
Corrected total	Blood pressure diastolic	47108401.70	11911			

Table 11: ANOVA Tests of Between-Subjects Effect of Religion on Weighted Infant Mortality

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	0.62	3	0.21	0.85	0.46
Intercept	1.91	1	1.91	7.92	0.01*
Religion	0.62	3	0.21	0.85	0.46
Error	5246.36	21758	0.24		
Total	6185.28	21762			
Corrected total	5246.98	21761			
a. R Squared =0.00 (Adjusted R Squared = 0.00)					

*Significantly Different at level of significance of 0.05

5.5 Logistic Regression Results for Effects on Termination of Pregnancy

Table 12 summarizes the logistic regression results. The logistic regression analysis showed the health-related decision variable of termination of pregnancy was significantly influenced or related by the independent variables of education (Wald (1) = 10.13, $p < 0.01$) and wealth index (Wald (1) = 4.80, $p = 0.03$). These results demonstrated that termination of pregnancy was significantly related with education and wealth index in Egypt. The logistic regression results in Table 11 indicates that the individual analysis of the relationship between termination of pregnancy and religion showed that religion is not significantly related with termination of pregnancy. The great disparity of Muslims and Christians in Egypt did not have a significant effect on blood pressure, termination of pregnancy, and weighted infant mortality. Thus, there is no need to run separate analysis on Muslim respondents and Christian respondents since religion individually did not have any significant relationship with any of the health-related decision variables. The coefficient of the odd ratio statistics of Exp (B) of the significance independent variables was investigated to determine change in the log odds of the dependent variable of termination of pregnancy for a one-unit increase in the values independent variables. The coefficient of the odd ratio statistics determined the odds that there will be a termination of pregnancy. The logistic regression model shows that having higher educational attainment results in 3% lesser odds to result in a termination of pregnancy. Having higher or richer wealth index also showed 3% lesser odds to result in a termination of pregnancy.

Table 12: Logistic Regression Results of Effects of Educational Attainment, Religion and Wealth Index on Termination of Pregnancy

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Religion	0.01	0.01	2.59	1	0.11	1.01
	Education	-0.03	0.01	10.13	1	<0.01*	0.97
	Wealth	-0.03	0.01	4.80	1	0.03*	0.97
	Constant	-1.13	0.04	737.47	1	<0.01*	0.32
a. Variable(s) entered on step 1: Education, Religion, Wealth.							
*. Significant at the 0.05 level of significance							

Table 13: T-Test Difference of Rates of Infant Mortality and Weighted Score of Infant Mortality of Egypt in the Years 2008 and 2014

		Levene's test for equality of variances		*T*-test for equality of means					95% Confidence interval of the difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
Infant mortality	Equal variances not assumed	458.49	<0.01	10.98	31065.95	<0.01	0.06	0.01	0.05	0.07
Weighted infant mortality	Equal variances not assumed	162.27	<0.01	7.32	34119.04	<0.01	0.04	0.01	0.03	0.05

5.5.1 Comparison of Infant Mortality of Egypt in Year 2008 and 2014

Another analysis was conducted to make a comparison of the data of the infant mortality data on the years 2008 and 2014. An independent sample *t*-test since there is only on independent variable of years and the dependent variable of infant mortality is a continuous variable. A significance level of 0.05 was used. Table 13 presents the descriptive statistics utilized in the calculation.

Table 14: Descriptive Statistics of Infant Mortality and Weighted Score of Infant Mortality of Egypt in the Years 2008 and 2014

	Year	N	Mean	Std. deviation
Infant mortality	2008	16527	0.18	0.56
	2014	21762	0.12	0.45
Weighted infant mortality	2008	16527	0.17	0.56
	2014	21762	0.13	0.52

According to Table 14, the results of the *t*-test analysis showed that both the number of infant mortality (t (31065.95) = 10.98, $p < 0.01$) and weighted score of the infant mortality (t (34119.04) = 7.32, $p < 0.01$) were significantly different between the years 2008 and 2014. The mean difference showed that the infant mortality in the year 2008 ($M = 0.18$) was significantly higher by 0.06 than the infant mortality in the year 2014 ($M = 0.12$). Also, the mean difference showed that the weighted score of infant mortality in the year 2008 ($M = 0.17$) was significantly higher by 0.04 than the infant mortality in the year 2014 ($M = 0.13$).

6. Discussion

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. By identifying the key factors that shape health outcomes and health-related decisions, governments and social institutions can take better informed actions to address health outcomes like blood pressure, infant mortality, and termination of pregnancy. These findings contribute to the current literature and create the possibility for further studies to define various communities as distinct cultures, which would open new frontiers in health disparities research. Although religion was shown to have no effect on health outcomes, the results should not to be interpreted to signify that religion has no effect at all on health outcomes.

The comparison in Egypt was an interfaith comparison due to the fact that very few respondents to the DHS survey administered in Egypt claimed to have no religious affiliation, where most respondents in Egypt adhere to one of two firmly established religions, Christianity and Islam. Hence, there was no way to compare those who adhere to a specific faith and those who do not adhere to any faith at all.

This study did not identify any statistical relationship between the independent variables and blood pressure. However, the results should not to be misinterpreted to signify that blood pressure isn't affected by education, religion, or wealth at all. For example, the Egyptian National Hypertension Project reports that the prevalence, awareness, and treatment of hypertension vary by region and rates tend to be the lowest in areas of lower socioeconomic status (Ibrahim et al., 1995).

Nonetheless, the purpose of our blood pressure study was to identify social factors that affect health decisions and outcomes on a broader level by accounting for the entirety of Egypt as opposed to a public health case study based on specified individual populations and locations. Further research should be conducted to identify the systematic changes responsible for significantly decreasing the number of infant mortality in Egypt from 2008 to 2014. Other factors to consider include examining the underlying cause of infant mortality and a closer look at the demographic. Considering that children are typically given priority in regards to healthcare, we believe infant and child mortality rates are reasonably reliable measures of a nation's healthcare system.

Statistics indicate that under-five mortality is lower among urban children (23 deaths per 1,000) than rural children (34 deaths per 1,000), and the differential in under-five mortality between children living in rural Lower Egypt and rural Upper Egypt is particularly marked (28 and 42 deaths per 1,000, respectively). In terms of preventable diseases, DHS estimates that 92 percent of children age 18-29 months are immunized against all major preventable childhood diseases, (i.e., they have received a BCG, three DPT and three polio immunizations, and a measles vaccination). Future research can identify whether there is a significant relationship between social factors and seeking treatment for common medical complications such as diarrhea and acute respiratory illnesses.

7. Conclusion

The objective of this study was to determine whether educational attainment, religion and wealth index were related to health outcomes and health-related decisions such as high blood pressure, termination of pregnancy and infant mortality in Egypt. The numbers of termination of pregnancy and instances of infant mortality significantly differed when there were differences in educational attainment and wealth index among the samples in Egypt.

Those with lower levels of education in Egypt had higher infant mortality than those with higher education levels. Higher wealth index in Egypt was also associated with a lower rate of infant mortality. In addition, individuals with lower levels of education in Egypt had higher number of termination of pregnancy than those with higher education levels. In contrast, having a higher wealth index decreased the odds of termination of pregnancy.

The relationship of religion with termination of pregnancy and infant mortality in the previous ANOVA was not controlled by other demographic characteristics of education attainment and wealth index. The *t*-test showed that the infant mortality in Egypt in the year 2008 was significantly higher than in the year 2014 suggesting possible improvement.

In this study, wealth and educational attainment stood out as having the largest impact on health-related outcomes, behaviors, and decisions. The lasting effects of colonization are a potential area of future study. A strong civil society was already in place prior to British colonization of Egypt. Egypt was also able to maintain its strong foundations prior to and after colonization. Further research studies should assess other groups in additional countries to address generalizability.

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