

A Work Project, presented as part of the requirements for the Award of a Master's degree in
Economics from the Nova School of Business and Economics.

Traditional Beliefs and Access to Modern Medicine: Demand for Maternal and Child Health
Care in Rural Guinea Bissau

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***Abstract:** This Work Project was born and built in the context of the *Belief Systems and Health Behaviors in Guinea-Bissau* project. This dissertation explores the relationship between access to healthcare and traditional beliefs as drivers of modern medical care demand. Access to health facilities is a widespread barrier to the adoption of preventive and treatment health measures. In addition, traditional beliefs and consequent cultural behaviors are also a barrier to medical care seeking behavior. This thesis explores how the magnitude of believing in traditional theories evolves as the distance to the nearest health facility increases.

Keywords: Development Economics, Maternal Health Care, Child Health Care, Access to Care, Traditional Beliefs, Guinea-Bissau

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“There is potentially another reason the poor may hold on to beliefs that might seem indefensible: when there is little else they can do, hope becomes essential.”

Poor Economics

1. Introduction

This dissertation originated from and is part of the NOVAFRICA investigation, the *Belief Systems and Health Behaviors in Guinea-Bissau* research project. This paper aims to infer the role and strength of traditional beliefs on health behaviours, particularly among mothers and mothers to be. The project proposes the implementation and randomised evaluation of a new type of health campaign which brings together modern and traditional health workers in Guinea-Bissau to jointly clarify certain symptoms and medical conditions that are often interpreted, in the rural context of Guinea-Bissau, like spells or curses.

For the implementation process of the NOVAFRICA research project, I was part of the field research team in Guinea-Bissau in 2021, where we worked and implemented a survey on the quality of 25 Health Centres in the regions of Cacheu and Biombo. Before that, a baseline survey of the mothers and pregnant women was conducted in 2019 in the scope of the *Belief Systems and Health Behaviors in the Guinea-Bissau* research project.

Guinea-Bissau is very ethnically diverse, about 84% of the population belongs to five different ethnic groups (UNICEF 2019) which can be found in a specific region of the country. Furthermore, in accordance with a study by the Pew Research Centre conducted in 2010, the individuals' religion is widely distributed among the population, not having a dominant

religion², this wide distribution is a consequence of a large number of ethnic groups. Guinea-Bissau, like many other African countries, has a moderate to high rate of traditional beliefs and practices, especially the participation in rituals that aim at solving health problems or at protecting against evil spirits or curses. Pew Research Centre (2010) found that 39% of a representative sample of individuals hold “high levels” of traditional beliefs, which were translated into beliefs in reincarnation, witchcraft, evil spirits and others. In addition, Guinea-Bissau ranks six out of nineteen Sub-Saharan African countries in terms of traditional beliefs and culture. The primary interest and hypothesis of this dissertation is to find to what extent the existence of beliefs prevents the mothers from adopting modern health methods that are safer and more suitable for themselves and their children.

Guinea-Bissau road infrastructure remains critically underdeveloped. The World Food Programme reported that only 10% of the roads in Guinea-Bissau are paved and that the unpaved roads have many deep potholes. As Queiroz and Gautam (1992) found, there exists a strong association between economic development and road infrastructure. In addition, these authors notice that the per capita stock of road infrastructure in high-income countries is greater than in low-income countries. A World Bank report from 2019 highlights the fact that distance and accessibility critically determine the demand for health care in Guinea-Bissau, especially when a woman is pregnant and, in some cases, the only option of getting to the Health Centre is at least a walk of four to five hours. My second hypothesis is that when the mother’s tabanka³ is somewhat close to the Health Centre the strength of her beliefs in Health treatment decreases, meaning that, if the health facility is close, the probability of going there increases. Summing up, the aim of this dissertation is to establish a relation between traditional beliefs and health-

² Approximately 45% is Muslim, 31% follows indigenous religious practices, and 22% is Christian. The remaining 2% are small communities of Buddhists, Hindus, and Jews, many of whom are foreign citizens (US Department of State 2020)

³ Tabanka is a term referring to the mother’s village.

related decision of mothers in rural Guinea-Bissau and to what extent accessibility play a role in this relation.

The present research is a contribution to the literature in the sense that, firstly, it evaluates the effect of distance on the health care demand in Guinea-Bissau, which has been done for some countries in Africa, but not for this particular country. Secondly, and the main contribution is, to understand whether the impact of distance on the demand for modern medicine is the same for mothers that hold certain traditional beliefs and theories and for those that do not. The intention is to test the hypothesis that the strength of one individual's beliefs can decline when a health care facility is closer. If that is the case, increasing the number of facilities could contribute to fighting the power of beliefs in health-related behaviors. Guinea is somewhat far behind in the process of improving Health Care accessibility, therefore it is extremely important to understand what research indicates the main drivers of individuals' Health Care seeking behavior are, to make more appropriate policy decisions.

2. Literature Review

The subject of mothers' and children's access to health care and the factors influencing demand for health care services has been a matter of discussion and research in the last decades. Additionally, health care access relies on multiple characteristics that include geographic accessibility, availability, health-related beliefs, and financial accessibility.

Theoretically, the distance to the health facility represents a heavy cost in the decision-making process of individuals. In fact, research has been proving that access can play a major role in the regions' aggregate health outcomes. Currie and Reagan (1993) found that one extra mile from the hospital is associated with a significant decrease in the probability of visiting the

doctor for a check-up in the Afro-American community of the United States. McGuire et al. (2021) also concluded that, in the rural regions of Malawi, the probability of accessing the nearest health facility decreases as distance increases. More concerning, distance to the health facility might even contribute to the infant mortality rate as Kadobera et al. (2012) and McGuire et al. (2021) conclude. Arif (2004) and Filmer (2015) explore the fact that increasing the number of health facilities, significantly increases the access to health care. Furthermore, access to health facilities is also influenced by weather conditions, especially in regions where roads are not paved and walking can be the individual's only option, as prompted by Blanford (2012). Nyamtema et al. (2016) found that increasing the number of maternal health care facilities in the rural areas of Tanzania increases the access to care, resulting in more safety of maternal and perinatal care, like deliveries.

Individual's beliefs related to health have also been shown to be an important determinant of health behaviors and outcomes. Roy et al. (2004) found that there exists a significant link between ethnicity and health beliefs and practices in the multi-racial population of the United States. Ashraf et al. (2017) found that those individuals that admit holding traditional beliefs are the ones disregarding past risky experiences related to giving birth in preparing for future risks. Although this conclusion is somewhat specific, it allows to reflect on how an individual's beliefs are related to health related behaviors. In addition, Oosterbaan and da Costa (1995) in the context of an anthropological study in Guinea-Bissau, discuss that traditional beliefs and behaviors are intrinsically connected to health demand.

There is a great number of papers reflecting on the social and economic factors that influence the health-related decisions of mothers in Africa. Apart from access and beliefs, other factors have been found to influence the decision of mothers to seek health care. Kovsted et al. (2003)

showed that, in the particular context of Guinea-Bissau, the mother's health knowledge, age and education have a significant effect on the children's health status and, consequently, on child mortality. The number of children in the family and whether the mother is solely responsible for her children are also factors that play a role in the decision to seek health care. Arthur (2019) and Arif (2004) came to this conclusion in the context of such in Ghana, Kenya, Zambia and Pakistan.

The conditions of the health care facilities as aspects conditioning the mother's decision are less discussed in the literature, however, Mariko (2003) shows that the availability of drugs and personnel are determinants. Arif (2004) found that the existence of piped water positively influences the demand for care and Purohit (2003) found that electricity in the centre also has a positive impact in demand.

3. Context

Guinea-Bissau has one of the weakest economies in the world, ranking 175th out of 189 countries in the 2020 Human Development Index. In addition, the country has an extremely poor population with nearly 70% living below the poverty line (World Food Program 2021). The country's weak institutions and stagnated economy are consequences of the extended political instability brought by, firstly, the Portuguese colonial period where the slave trade and the intensive extraction of resources contributed to a damaging dynamic of the country's economy, after that, a long and deathful independence war in 1974 that damaged the country economically and physically, followed by the civil war in 1998, and after that a period of many political coups consequently removing the government in power.

Guinea-Bissau is economically fragile being highly dependent on agriculture⁴, exporting commodities, exposing the economy to external shocks, and foreign assistance. Together with an ethnically diverse population and its numerous languages and customs, the strong culture of traditional health beliefs is highly associated with health behaviors, such as going to a traditional healer for medical purposes or believing that certain illness symptoms are in fact spells or punishments.

The country has a poor health system and it faces challenges in terms of the country's low public spending on health, poor infrastructure, not only low-skilled health workers but also low number of nurses and doctors, and inadequate equipment and supply of medicines. UNICEF (2017) estimates that 66% of the population lives more than five kilometers from the nearest health facility and that the country's average is one health centre for more than 13,500 inhabitants. A probable consequence of these factors is the high infant mortality rate, at 85.7 deaths/1,000 births, being the 4th highest in the world, with the maternal mortality ratio of 549/100,000 births (World Bank 2019). Given that most households' income depends on agricultural activities for the production of a highly seasonal export crop (cashew nuts) and that the population is mostly rural, a substantial number of families are food insecure, having over 25% suffering from chronic malnutrition (WFP 2021). A key contributing factor to the household's wealth and food security is the poor quality of the country's road network, only 10% of the roads are paved, which limits the access to food markets, and essential services such as health, contributing to reduced welfare of rural areas.

⁴ Agriculture comprises between 40% and 50% of GDP and employs 80 % of the labor force (World Bank 2019)

Bringing together a culture of traditional health practices, a concerning quality of health supply and, in many situations, a challenging access to Health Care facilities, we observe, as in many developing countries, low adoption of preventive health practices and services.

4. Data

The sources of the data used in this dissertation are both from the *Belief Systems and Health Behaviors in the Guinea-Bissau* project. The two data sets are combined and utilised for the purpose of the thesis⁵.

4.1. Baseline Survey

In March of 2019, a baseline survey was administered to 1,303 mothers across 156 villages in the regions of Biombo and Cacheu. The survey included questions on demographics, household decision making, family consumption and assets, general traditional beliefs, traditional practices and health behaviors, namely regarding maternal health and child health care (Baseline Report 2020).

4.2. Health Centre Survey

In October of 2021, a survey of 25 Health Care facilities in the rural regions of Bimbo and Cacheu was conducted. This contains information on the equipment, physical structure, availability of medicines, instruments, services offered and exams, and quality of medical workers of the Health Centres.

The data set used in this working paper is a combination of both data sets. First, the coordinates of the mothers' locations and of the Health Centres were extracted from each data set to an

⁵ If requested, both data sets will be provided.

excel file where distances were computed. The merging was done so that to each mother would correspond the distance between her and the nearest health facility and the data on that specific health centre. Because one of the major hypotheses to be tested is whether distance affects the decision to go to the Health Centre, only the observations that include a GPS was considered. As a consequence, the Baseline data set was limited. Thus, the data set contains information about 680 mothers from the regions of Biombo and Cacheu.

4.3. Descriptive Statistics

The sample includes information on mothers, pregnant women, and Health Centres. Of the mothers and pregnant women interviewed aged 15 through 62 years old, 28.7% of the mothers did not go to school and the largest share of them, after that, is the almost 12% of women that have completed 7th grade. 12.4% of mothers are pregnant, knowing that 1.91% are pregnant for the first time, and 86% are married. The average mother has 3.2 children, and the maximum number of children is 9. Only 26.26% never gave birth at their own house or the tabanka, and the average woman gave birth at home or the tabanka 2.2 times. 31.1% of the mothers in the sample have lost one baby and 53.3% of these have lost at least one baby during pregnancy. Regarding traditional beliefs, 29.47% of the mothers went to a Djambako/Mouro⁶ at least once in the last 6 months at least once, almost 58.3% believe that witchdoctors have the power to cure diseases and about 77.8% believe that spells can kill people. Finally, if their child was sick, about 14,33% of the mothers would take her or him to a Djambako/Mouro.

Table 1 - Descriptive Statistics – Mothers and Pregnant Women

Variable	Observations	Mean	Std. Dev.
Age	636	28.42	6.853
Number of children	636	3.209	1.862
Woman is currently pregnant	631	.124	.329

⁶ Witchdoctors, traditional religion specialists. Witchdoctors are known by Djambakos or Mouros, corresponding to Christian or Muslim religion, respectively.

Woman is married	600	.86	.347
Male responsible for the child	636	.921	.269
Distance to nearest Health Centre (in km)	636	6.8	4.2
Did not go to school	635	.287	.453
Mother pays bills alone	636	.085	.279
Mother decides alone on food for the house	636	.058	.234
Mother decides alone where the child goes if sick	636	.52	.499
Believes Cure	480	.583	.494
Visited the Djambako/Mouro at least once	635	.295	
Believes Protection	636	.659	.474
Believes Spells	635	.778	.416
If the child was sick, would take to a witchdoctor	636	0.143	0.35
Has ever lost a child	635	.311	.463
Lost a child during pregnancy	198	.535	.688
Gave birth at the centre in the last pregnancy	657	.4247	.495
Wants to give birth at the centre in the next pregnancy	657	.726	.446
Number of times gave birth at home/tabanka	636	2.208	2.021

Source: Baseline Survey (2019) Guinea Bissau

The Health Centres' sample has information on 25 facilities in the regions of Biombo and Cacheu. In terms of availability of equipment, the data was slightly heterogeneous, in some aspects, the facilities have identical conditions whereas in others the distribution is wide. 48% of all Health Centres do have ambulances to transport their patients, and of those that have, only one provides this service for free. We wanted to know the most common transport of the patients and we found that the majority of them walk. The option of taking a taxi to the Health facility is expensive for the population. Almost all centres have working energy, only 52%

have piped water and all the 25 facilities have a refrigerator, which is particularly critical in the rural context of Guinea-Bissau, where the climate is tropical and hot all year round. When it comes to hygiene, all the workers clean the facility at least once a day. Only two Centres have a phone to contact the patients, although most of the workers being interviewed admitted that they use personal phones to contact patients when necessary. A large share of the Health Centres cannot offer the possibility of doing ultrasounds or X-rays, this is concerning given that this type of equipment is essential to diagnose important medical conditions. Finally, 68% of the centres have no capacity to keep any patient overnight which can compromise many treatments.

Table 2 - Descriptive Statistics - Health Centers

	Observations	Mean	Std. Dev.
Centre has ambulance	25	0.48	0.51
Ambulance is free	25	0.04	0.2
Centre has piped water	25	0.52	0.51
Centre has working energy	25	0.8	0.408
Centre has a phone	25	0.08	0.277
Centre has a refrigerator	25	1	0
Centre has an X-Ray	25	0.04	0.2
Centre has an ultrasound	25	0.12	0.332
Centre is cleaned once a day	25	1	0
Patients can spend the night at centre	25	0.68	0.476
Workers have training to deliver babies	24	1	0
Number of doctors working at the centre	13	3.846	7.701
Sum of Exams provided at the centre	24	4.583	1.412
Sum of Instruments present at the centre	24	13.833	3.358
Sum of Medicines present at the	24	10.5	3.336

centre			
Health Centre has Insulin	24	0.167	0.381
Medicines out of date at the Centre	25	0.64	0.49
Giving birth is free at the Centre	24	0.96	

Source: Cacheu and Biombo 25 Health Centre Survey (2021) Guinea Bissau

In terms of personnel, all Centres have someone to deliver babies and reported that all of them had special training to perform births. Even though the average number of doctors is almost 4 per Centre, the median value of the sample is 1 doctor per centre⁷. In terms of working hours, the Centres are very heterogeneous, with about 40% open 24 hours a day, about 15% only closing at night and 55% open only in the mornings and afternoons.

The availability of medicines is very heterogeneous among the 25 centres, almost 80% had more than half of the items from the list of essential medicines⁸, and two of them had all of the medicines. We found that the medicine that lacks the most among the centres is Insulin, about 83% of the Centres did not have it. Unhappily, about 70% reported that had medicines at the centre that were not within the expiration date. In terms of costs, the reality is homogeneous, with all pre and postnatal appointments, the baby's delivery and children's appointments being free in all centres, except in one.

4. Methodology

The models used to test the hypothesis of this project are of the form:

$$Y_i = \alpha_i + \beta_i \text{Distance}_i + \delta_i \text{Distance}_i^2 + \gamma_i \text{Beliefs}_i + X + FE + \varepsilon$$

$$Y_i = \alpha_i + \beta_i \text{Distance}_i + \gamma_i \text{Beliefs}_i + \partial_i [\text{Believes Protection}_i * \text{Distance}_i] + X + FE + \varepsilon$$

⁷ Note that only 13 respondents reported how many doctors work at the centre, the remaining 12 did not know.

⁸ Please consult this list in the Appendix.

where Y is the outcome of interest, Distance is the length of a straight line, in km, between the mother's location and the nearest Health Centre; Beliefs are some indicators of the mother's traditional beliefs, like whether mother believes that spells can cure, or whether she believes spirits and witchcraft can protect one individual. Moreover, X is a vector of controls that include mother's socioeconomic characteristics and Health Centre conditions and FE is the inclusion of tabanka-level fixed effects.

In this study, distance to the Health Centre has been measured using the Euclidean distance formula which calculates the straight line distance between two pairs of coordinates. Travel distances were considered, however due to two main reasons the Euclidean distance was chosen. The first reason is that it was difficult to compute travel distances using "Routes" of Bing Maps⁹, the second one was the fact that, given that the main way of transportation to the health center is walking, individuals will most probably use informal paths and roads that are translated into a shorter displacement¹⁰. The demand for formal health has been measured using three indicators; whether the mother gave birth at the Health Centre or the Hospital, whether the mother, if pregnant would like her delivery to happen at the Health Centre or the Hospital, and whether the mother took her child to the Health Centre or to the Hospital the last time the child was feeling sick. These three indicators have been withdrawn from the 2019 Baseline survey of the *Belief Systems and Health Behaviors in the Guinea-Bissau* research project. In this survey, the respondents were asked about their own traditional beliefs and practices such as if the woman believes that spells can kill or curse and if the woman believes Djambakos/Mouros can protect humans with their traditional rituals and treatments. Several

⁹ The program computed very largely and unrealistically distances; it did not recognize fewer principal roads.

¹⁰ Please see McGuire et al. (2021) for more evidence on this.

controls are included in the model, namely usual social and economic characteristics, such as the mother's age, marital status, education, among others that can be consulted in the Appendix, and the category of the associated nearest Health Centres, which is the country's code indicative of the size of the facility¹¹.

To test the hypothesis of this dissertation a logistic model was applied. The model was chosen due to the dichotomous nature of the dependent variables. The logit model uses the cumulative distribution function of the logistic distribution which is able to rescale and limit the outcome to fall between 0 and 1 better than a linear regression. In order to better interpret results, I supply the marginal effects in the main body of the report, including the original logit results in the Appendix.

5. Results

5.1. Logit Model Results

The Logit Model results are presented in Tables 3 and 4, and in order to better interpret them, the Average Marginal Effects (AME) were estimated. Because the marginal effects are computed for every observation and then averaged for the entire sample, the coefficients presented in Tables 3 and 4 better represent the individuals as a whole.

The results in Tables 3 and 4 provide evidence that the longer the distance is between the mother's house and the nearest health facility the lower the probability of visiting the centre.

Table 3 shows that an additional kilometer between the mother's tabanka and the health centre significantly decreases the probability of giving birth at the centre by 4.99%¹² for past

¹¹ At the local level, primary care is offered by 132 health centres in the country. These facilities are classified as A, B e C, distinguished by its capacity to offer medical interventions more or less complex. Type C would be the kind of centre that offers the most complex interventions (Kitson 2019)

¹² The impact on probability is $(-0.0534 + 2*0.00176)*100$

pregnancies and by 7.01% for hypothetical pregnancies. This result indicates that the negative relation between distance and hypothetical or expected births at the centre is stronger when compared to effective ones.

Table 3: Average Marginal Effects - Mother's Decision on Place of Birth

Dependent Variable	Delivery was at the Centre			Would give birth at Centre		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to the closest center	-0.0395** (0.0183)	-0.0438** (0.0188)	-0.0534** (0.0212)	-0.0643*** (0.0173)	-0.0659*** (0.0180)	-0.0775*** (0.0220)
Distance ²	0.00127 (0.00109)	0.00156 (0.00111)	0.00176 (0.00125)	0.00267*** (0.000986)	0.00278*** (0.00103)	0.00336*** (0.00120)
Believes Protection	-0.150*** (0.0452)	-0.134*** (0.0461)	-0.163*** (0.0463)	-0.129*** (0.0430)	-0.117*** (0.0441)	-0.116** (0.0488)
Believes Spells	-0.00502 (0.0531)	0.000413 (0.0545)	0.0408 (0.0556)	-0.108** (0.0537)	-0.132** (0.0566)	-0.109* (0.0554)
Controls	N	Y	Y	N	Y	Y
Fixed Effects	N	N	Y	Y	Y	Y
Observations	635	593	471	516	480	388

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In addition, Table 3 suggests that those mothers that manifested to have certain traditional beliefs, especially those believing in spirits and witchdoctors protection, have a lower probability of delivering or wanting to deliver in future at the health centre than those that did not manifest such beliefs. The results in column (3) show that, when controlling for fixed effects at the tabanka level, the probability of having delivered at the centre for mothers who believe in protection is 16.3 % significantly lower than for the mothers that do not believe in protection. For hypothetical or future pregnancies believing that spirits provide protection is associated with a decrease in the probability of wanting to give birth at the centre by 11.3%,

compared to mothers that do not hold such beliefs. In addition, a mother that believes that spells can cure is 10.1% less likely to deliver at the centre than a mother that does not have such beliefs. People are more optimistic relative to future decisions, therefore, the significant relation between believing in spells and wanting to deliver at the centre might be explained by the fact that, because more mothers in the sample wish to deliver at the centre than those that did so in the past, the mothers that do not wish to give birth at the centre are the ones that have stronger beliefs, making different kinds of beliefs significant in this case.

Table 4 shows that an additional kilometer away from the health facility significantly decreases the probability in 3.24%¹³ of, in the event of the mother's child being sick, taking her or him there seeking care. This implies that distance plays a less strong role in the decision to seek care for a sick child set against the decision on where to deliver, which might be explained by the difficulty of walking to the health centre when the mother is pregnant or by the fact that it is more usual for the mother to deliver at home with the assistance of a midwife than it is to heal a child.

Table 4: Average Marginal Effects - Mother's Behavior on Treatment for her Child

Dependent Variable	Treat Child at the Centre		
Distance to the closest centre	-0.0214*	-0.0308**	-0.0359
	(0.0110)	(0.0125)	(0.0223)
Distance ²	0.000894	0.00139**	0.00173
	(0.000599)	(0.000665)	(0.00115)
Believes Protection	-0.0152	0.000174	-0.0138
	(0.0251)	(0.0248)	(0.0240)
Believes Spells	-0.140**	-0.141**	-0.130*
	(0.0642)	(0.0621)	(0.0714)
Controls	N	Y	Y
Fixed Effects	N	N	Y
Observations	634	593	471

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

¹³ The impact on probability is $(-0.0359 + 2*0.00173)*100$

Believing in spirits and Djambakos/Mouros protection has a negative effect on the probability of taking the child to the health centre, however, this effect is not significant. On the contrary, a mother that believes that spells can cure diseases is less likely to seek care for her child at the centre, by 13%. This can be explained by the same reason as in the case of future pregnancies. Nevertheless, notice that this output refers to treatment behavior, whereas in the case of deciding where to give birth mothers are not deciding on treatment options. Therefore, it makes sense that believing that witchdoctors' spells can cure is significantly associated with the idea of not taking a sick child to the health centre in this scenario, mostly probably mothers that believe that Djambakos have the power to heal will visit him to seek for a cure. In conclusion, a mother that has a sick child and that believes in a traditional treatment will certainly and significantly be less likely to seek for modern medical care, when compared to a mother that does not hold such beliefs.

5.2. Interaction Between Distance and Beliefs

In addition to this, it was estimated the same Logit model including an interaction term between distance to the health centre and the variable indicating whether the mother believes in protection. The main purpose of this interaction is to learn whether the relation between distance and the demand for modern medicine is the same for mothers that hold traditional beliefs and for those that do not. The Marginal Predicted Probability of visiting the centre for mothers that believe in protection (= 1) and for those that do not believe in protection (= 0) was computed for different levels of distance¹⁴ between the mother and the health facility.

¹⁴ The representative values of the variable distance were chosen based on the variable's distribution and percentile.

For each value expressed in km, the derivative of believing in protection with respect to distance is calculated. Table 5 shows that the probability of a mother giving birth at the centre in past pregnancies differs between those mothers that have traditional beliefs and those that do not, but also between mothers that live near the centre and far from it. For instance, a mother that does not believe in protection and that lives at the centre (0 km) has a predicted probability of having given birth at the centre in the past of 70.3%. A mother that does believe only has a probability of 54.5% to have delivered at the centre. At the average value of distance, not believing in protection is associated with a predicted probability of having delivered at the centre of 57.7%, whereas believing in protection is associated with a probability of 38.8%. This is the case for all sets of distances from the centre: mothers that admit believing in protection present a lower probability of having delivered at the centre. Additionally, the probability of visiting the centre that is explained by believing in spirits protection decreases as distance increases. Meaning that a mother that has traditional beliefs and lives further away from the centre will less likely seek for care at the centre than a mother that also has traditional beliefs but that lives near the centre.

Table 5: Marginal Predicted Probability of Positive Outcome within different values for Distance to Centre

Dependent Variable	Delivery was at the Centre		Would give birth at Centre		Treat Child at the Centre	
	Believes Protection	Believes Protection	Believes Protection	Believes Protection	Believes Protection	Believes Protection
Distance in km	0	1	0	1	0	1
0	0.734***	0.572***	0.889***	0.826***	0.941***	0.970***
3	0.669***	0.491***	0.860***	0.773***	0.943***	0.958***
5	0.621***	0.436***	0.837***	0.732***	0.944***	0.948***
6.8 (mean)	0.577***	0.388***	0.814***	0.691***	0.946***	0.937***
9	0.521***	0.331***	0.783***	0.638***	0.947***	0.921***
16	0.345***	0.185***	0.662***	0.451***	0.950***	0.839***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

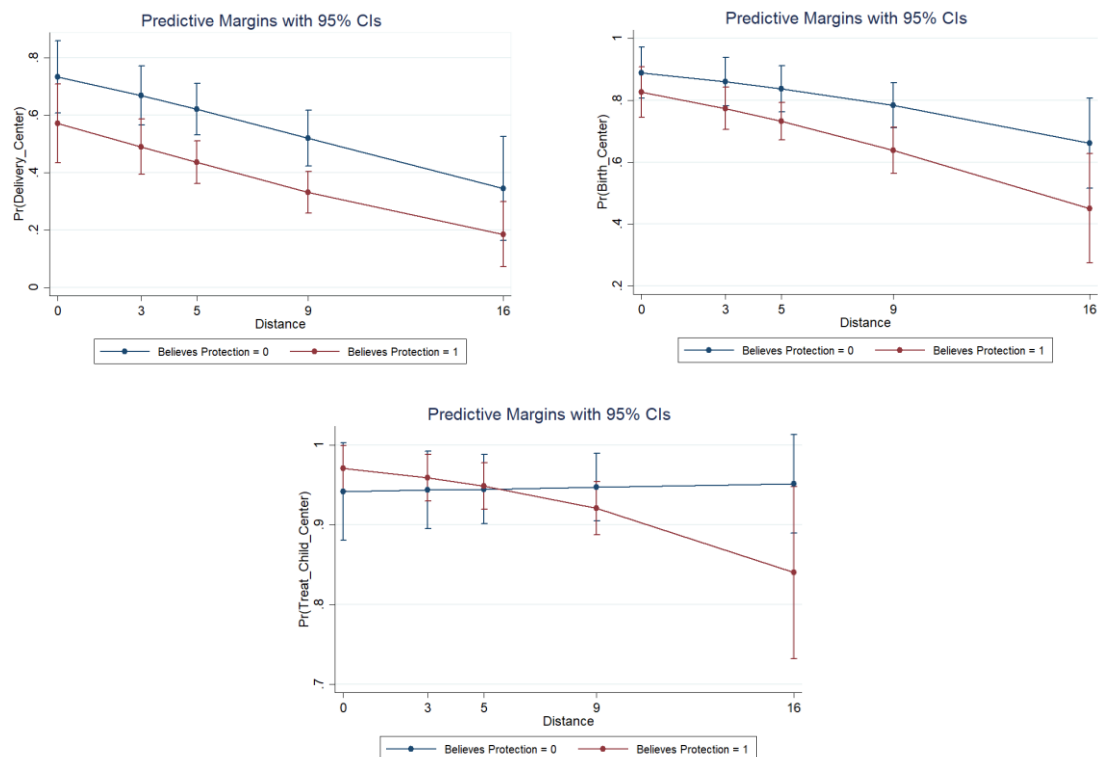
A similar tendency can be verified for the probability of the mother wanting to deliver at the centre in a future pregnancy: as distance increases, the predicted probability of wishing to give birth at the centre decreases and mothers that have traditional beliefs are associated with lower predicted probabilities than those mothers that do not. However, the sizes of the effects on the probability of wanting to deliver at the centre are higher. This insinuates that, in spite of believing in protection and the distance to the health facility, mothers generally wish to give birth at the centre in their next pregnancy. Although this is what the data shows, it is always important to remember that it is “easier said than done”. Specifically, at the average distance, mothers that believe in protection have a predicted probability of wanting to deliver at the centre of 69.1%, and mothers that do not believe in protection have a predicted probability of 81.4%, which translates into a slightly lower difference between the two groups, comparing to the first case¹⁵.

The sizes of the predicted probability of deciding to take a sick child to the centre are similar between the two groups of mothers. Despite their beliefs, mothers seek for care at health facilities similarly. In particular, at the average value of distance, believing in protection is related to a 93.7% predicted probability of taking a sick child to the centre, whereas not believing in protection is related to a probability of 94.6%. For mothers that do not hold traditional beliefs, the impact on the probability to take the sick child to the health centre is somewhat stable as the distance increases. This is not the case for mothers that hold traditional beliefs, as the size of the impact of distance on the predicted probability declines for higher levels of distance to the centre.

¹⁵ Differences between two groups of mothers (at mean): Delivery was done at the centre = $0.577 - 0.388 = 0.189$. For future/hypothetical pregnancies = $0.814 - 0.691 = 0.123$

In Figure 1 it is possible to illustrate that the effect that distance has on the predicted probability of visiting the health centre varies based on both the level of distance between the mother and the centre and whether the prediction is for a mother that believes in protection or not. There are clearly interactive effects as the effect of distance depends on beliefs. The downward sloping lines presented in the graph represent mothers that do not believe in protection, the blue line, and mothers that believe in protection, the red line. Generally, as the distance between the mother's tabanka and the nearest health centre increases, the probability of had giving birth, wanting to deliver at the centre and taking a sick child to the centre decreases, as seen before. Relative to past pregnancies, the two groups of mothers are somewhat similar as the two lines are almost parallel, implying that a change in the probability of having delivered at the centre is mostly explained by beliefs. In fact, the difference between the two groups of mothers is statistically significant as the confidence intervals do not overlap.

Figure 1: Predicted Probability that the mother seeks care at modern health facilities (Pr) as a function of Distance for mothers that hold traditional beliefs and for those that do not.



The case for hypothetical pregnancies is more critical in terms of differences between believing in spirits protection or not given that the slope between the two derivatives changes as distance increases. At low levels of distance, the effects are similar in size for the two groups of mothers. However, as distance increases, the sizes diverge, and the effects appear larger for those that believe in protection. Remember that in Table 3, when comparing to past pregnancies, the magnitude of the coefficient associated with believing in protection was lower. That can be noticed here as the difference between the two groups of mothers is not statistically significant. This is also the scenario for treating a sick child at the centre, only in this case the mothers that do not hold beliefs remain quite stable for different distances between the mother and the centre.

What this is suggesting is precisely what it was meant to be tested in the dissertation: a mother that admits to having certain traditional beliefs and that lives by the centre is more likely to seek care at the health facility when compared to a mother with the same beliefs but that lives further away from the centre. This insinuates that beliefs tend to lose strength when mothers are presented with an accessible solution for their health condition.

5.3. Complementary Results

The mothers' behaviors and decisions are driven by a set of numerous conditions, past experience, beliefs, and personality, among many others. It is relevant to take the advantage of such broad surveys to analyze what other social conditions of mothers can say about the demand for modern medical care.

In Table 6 are shown the Average Marginal Effects of the Logit Model including controls and fixed effects. The results suggest that, for the decision on where to deliver in the past and in

the future, education is an important and significant determinant. For instance, a mother that did not go to school is 20% less likely to have given birth at the centre in the past than a mother that did go to school. In addition, a mother that decides alone on where to take a sick child is 9.36% more likely to have delivered in the centre in past pregnancies. The number of children in the family has also a negative and significant impact on the decision to deliver at the centre in hypothetical or future pregnancies. And feeling pressure from other people in the tabanka to give birth at the centre significantly increases the probability of delivering at the health facility by 12.4%.

Table 6: Average Marginal Effects showing Controls

Dependent Variable	Delivery was at the Centre		Would give birth at Centre		Treat Child at the Centre	
Distance to HC	-0.0438**	-0.0534**	-0.0659***	-0.0775***	-0.0308**	-0.0359
	(0.0188)	(0.0212)	(0.0180)	(0.0220)	(0.0125)	(0.0223)
Distance^2	0.00156	0.00176	0.00278***	0.00336***	0.00139**	0.00173
	(0.00111)	(0.00125)	(0.00103)	(0.00120)	(0.000665)	(0.00115)
Believes Protection	-0.134***	-0.163***	-0.117***	-0.116**	0.000174	-0.0138
	(0.0461)	(0.0463)	(0.0441)	(0.0488)	(0.0248)	(0.0240)
Believes Spells	0.000413	0.0408	-0.132**	-0.109*	-0.141**	-0.130*
	(0.0545)	(0.0556)	(0.0566)	(0.0554)	(0.0621)	(0.0714)
Mother is married	-0.0388	-0.0148	-0.00842	-0.00311	0.000361	0.0189
	(0.0587)	(0.0636)	(0.0587)	(0.0711)	(0.0341)	(0.0400)
Age	-2.28e-05	0.00542	0.00825**	0.00667*	0.000157	0.000118
	(5.70e-05)	(0.00475)	(0.00357)	(0.00372)	(0.000874)	(7.54e-05)
Did not go to school	-0.162***	-0.200***	-0.113***	-0.111***	-0.0142	-0.00791
	(0.0448)	(0.0561)	(0.0396)	(0.0426)	(0.0216)	(0.0213)
Male Responsible	0.0852	0.151*	0.0286	0.0676	0.0410	0.0220
	(0.0722)	(0.0850)	(0.0706)	(0.0890)	(0.0382)	(0.0386)
Decides alone where to take child when sick	0.0847**	0.0936**	0.0120	0.00856	-0.00716	-0.0297
	(0.0385)	(0.0380)	(0.0349)	(0.0403)	(0.0199)	(0.0273)
Feels pressure by people in the tabanka to visit the center	0.0828	0.0750	0.0856*	0.124*	0.00161	-0.00657
	(0.0590)	(0.0628)	(0.0491)	(0.0668)	(0.0288)	(0.0351)
Number of children	-0.0161	-0.0212	-0.0271**	-0.0284*	-0.00401	-0.00522

	(0.0119)	(0.0170)	(0.0125)	(0.0147)	(0.00592)	(0.00762)
Fixed Effects	N	Y	N	Y	N	Y
Observations	603	476	603	476	603	476

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

6. Limitations and Further Research

In spite of the results in this dissertation, further research can be done to validate these conclusions. In that sense, the *Belief Systems and Health Behaviors in Guinea-Bissau* Randomized Control Trial will certainly contribute to understanding whether educating mothers and mothers to be in certain medical aspects might lead to higher adoption rates of modern medical care. One limitation of this paper is that it did not cover a supply analysis of medical services. Unfortunately, I could not find any relevant effects of the different quality indicators of the Health Centres. It would be really interesting to know what the effects of interesting indicators are, such as the number of workers, and professional training, among others, in the specific context of Biombo and Cacheu. In addition, it would be a great contribution to test whether more health care facilities would indeed increase the adoption rates of health care.

Further work on these topics might translate into more robust policy decisions that can improve child and maternal healthcare systems.

7. Conclusion

This dissertation highlights the behavioral relation between traditional beliefs and the mother's past decision on the place of birth, the desired place of birth for future pregnancies and the decision on where to take the mother's sick child. In addition, this research paper seeks to reflect on the relation between the distance to the nearest health facility and these maternal and

child health-related decisions. And finally, it tries to understand how the effect of distance behaves for mothers that admit to holding traditional beliefs and for those that do not.

This paper founds empirical evidence to suggest that not only do access and traditional beliefs play a significant and negative role in the decision to visit the health centre, but also it suggests that, if the health centre is more accessible, the importance and effect of traditional beliefs declines. The opposite happens when the health facility is not as accessible to the mother. This might suggest that beliefs may not determine health behaviors when the option of visiting the centre is right around the corner. Instead, people might hold on to beliefs due to convenience or as an expression of their hope.

This conclusion translates into a critical policy implication. Firstly, the complementary results reinforce the idea that educating and empowering women can improve the health status of the mother themselves and of their children. Secondly, the major findings in this dissertation implicate that, if the number of health facilities is expanded, the negative relation that the existence of traditional beliefs has on health outcomes can be attenuated. By investing in building new health facilities in the regions of Biombo and Cacheu, access to modern medicine can improve and the impact of beliefs and cultural theories can be fought, it is two birds with one stone strategy.

References

Adedokun, Sulaimon T. and Sanni Yaya. 2020. "Factors influencing mothers' health care seeking behaviour for their children: evidence from 31 countries in sub-Saharan Africa". *BMC Health Services Research* - <https://doi.org/10.1186/s12913-020-05683-8>

Ai, Chunrong and Norton C., Edward. 2003. "Interaction terms in logit and probit models". *Economic Letters* 80: 123-129
[https://doi.org/10.1016/S0165-1765\(03\)00032-6](https://doi.org/10.1016/S0165-1765(03)00032-6)

Angelo S. Nyamtema et al. 2016. "Enhancing Maternal and Perinatal Health in Under-Served Remote Areas in Sub-Saharan Africa: A Tanzanian Model". *PLOS one*
doi:10.1371/journal.pone.0151419

Arif, G. M., Shujaat Farooq, Saman Nazir and Maryam Satti. 2014. "Child Malnutrition and Poverty: The Case of Pakistan". *The Pakistan Development Review* 43 (3): 211–238
<https://www.jstor.org/stable/24397882>

Arthur, Eric. 2019. "The Effect of Household Socioeconomic Status on the Demand for Child Health Care Services". *African Development Review* 31 (1): 87-98
<https://doi.org/10.1111/1467-8268.12365>

Ashraf, Nava, Erica Field, Giuditta Rusconi, Alessandra Voena, and Roberta Ziparo (2017) "Traditional beliefs and learning about maternal risk in Zambia," *American Economic Review*, Vol. 107, No. 5: 511–515.

Atlassian. "Guinea-Bissau Road Network". World Food Programme
<https://dlca.logcluster.org/display/public/DLCA/2.3+Guinea-Bissau+Road+Network>

Banerjee, Abhijit V. and Duflo, Esther. 2012. "Poor Economics", *Poor Economics*

Blanford, Justine and Supriya Kumar, Wei Luo and Alan M MacEachren (2012) "It's a long, long walk: accessibility to hospitals, maternity and integrated health centers in Niger". *International Journal of Health Geographics* 2012, 11:24
<http://www.ij-healthgeographics.com/content/11/1/24>

Coutts, Alexander and Millán, Teresa Molina and Vicente, Pedro. 2020. "Belief Systems and Health Behaviors in Guinea-Bissau". *Work in progress*.

Currie, Janet and Patricia B. Reagan. 2003. "Distance To Hospital And Children's Use Of Preventive Care: Is Being Closer Better, And For Whom?," *Economic Inquiry*, 41: 378-391.
doi 10.3386/w6836

Favarato, Claudia. 2019. "Traditional Religion in Guinea Bissau Political Culture". *E-Journal of International Relations*, 9: 93-107
https://repositorio.ual.pt/bitstream/11144/3913/3/EN_JANUS.NET_VOL9N2_art07.pdf

Fernandes, António et al. 2020. "Read this if you want to learn logistic regression". *Revista de Sociologia e Política*

DOI 10.1590/1678-987320287406en

Filmer, Deon. 2005 “Fever and its treatment among the more and less poor in sub-Saharan Africa”. *Health Policy and Planning* 20(6):337-46
DOI: 10.1093/heapol/czi043

Kadobera, Daniel et al. 2012. “The Effect of Distance to Formal Health Facility on Childhood Mortality in Rural Tanzania, 2005-2007”. *Global Health Action* 5: 1-9.
DOI: 10.3402/gha.v5i0.19099

Kitson, Nichola. 2019. Pagamentos Informais no Setor de Saúde Pública na Guiné-Bissau. Portugal.
https://cdn.odi.org/media/documents/guinea-bissau_portuguese.pdf

Kovsted, Jens and Tarp, Finn and Portner, Claus C. 2002. “Child Health and Mortality: Does Health Knowledge Matter?”. *Journal of African Economics* 11: 542-560
DOI: 10.1093/jae/11.4.542

Mariko, Mamadou. 2003. “Quality of care and the demand for health services in Bamako, Mali: the specific roles of structural, process, and outcome components”. *Social Science [?] Medicine* 56(6):1183-96
Doi: 10.1016/S0277-9536(02)00117-X

McGuire, Finn and Kreif, Noemi and Smith, Peter C. 2021. “The effect of distance on maternal institutional delivery choice: Evidence from Malawi”. *Health Economics* 30: 2144-2167
<https://doi.org/10.1002/hec.4368>

Moody’s Analytics. 2020. “Guinea-Bissau - Economic Indicators”
<https://www.economy.com/guinea-bissau/indicators>

Mwabu, Germano “Health Development in Africa”. *African Development Bank: Economic Research Paper* n.38
<https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/00157610-EN-ERP-38.PDF>

Nova School of Business and Economics. 2019. “Interpreting Model Estimates: Marginal Effects”
https://clas.ucdenver.edu/marcelo-perraillon/sites/default/files/attached-files/perraillon_marginal_effects_lecture_lisbon_0.pdf

Oosterbaan and Costa. 1995. “Guinea-Bissau: What Women Know about the Risks: An Anthropological Study”. *World Health Statistics Quarterly*, 48: 39.

Pew Research Center. 2010. “Traditional African Religious Beliefs and Practices”
<https://interfaithalliance.org/cms/assets/uploads/2018/07/pew-tradl-african-religious-beliefs-and-practices.pdf>

Purohit, Brijesh C. 2013. “Demand for Healthcare in India”. *Healthcare in Low Resource Settings* 2013; 1:e7

doi:10.4081/hls.2013.e7

Queiroz, Cesar and Surhid Gautam. 1992. “Road infrastructure and economic development: some diagnostic indicators”. *Western Africa Department and Infrastructure and Urban Development Department - The World Bank*.

https://www.researchgate.net/publication/23723878_Road_infrastructure_and_economic_development_some_diagnostic_indicators

Roy, Lonnie C., Diana Torrez and Joanita Conkin Dale. 2004. “Ethnicity, traditional health beliefs, and health-seeking behaviour: Guardians' attitudes regarding their children's medical treatment”. *Journal of Paediatric Health Care*: 22-29

[https://doi.org/10.1016/S0891-5245\(03\)00112-3](https://doi.org/10.1016/S0891-5245(03)00112-3)

Santos, Rita and Hugh Gravelle and Carol Propper. 2015. “Does Quality Affect Patients' Choice of Doctor? Evidence from England”. *The Economic Journal*: 127 (March): 445–494.

Doi: 10.1111/eoj.12282

Schoeps, Anja. 2011. “The Effect of Distance to Health-Care Facilities on Childhood Mortality in Rural Burkina Faso”. *American Journal of Epidemiology* 173: 492-8

Doi: 10.1093/aje/kwq386

Stata Journal. 2011. “Using Stata's Margins Command to Estimate and Interpret Adjusted Predictions and Marginal Effects”. Revised January, 2011. <https://www3.nd.edu/~rwilliam/stats/Margins01.pdf>

UNICEF. 2017. “Community health: Scaling up community-based interventions to reduce infant and maternal mortality” <https://www.unicef.org/guineabissau/community-health#:~:text=Challenges,for%20more%20than%2013%2C500%20inhabitants.>

UNICEF. 2019. Situation Analysis of Children's Rights and Well-being in Guinea-Bissau.

<https://www.unicef.org/guineabissau/media/1316/file/SITUATION%20ANALYSIS%20OF%20CHILDREN%E2%80%99S%20RIGHTS%20AND%20WELL-BEING%20IN%20GUINEA-BISSAU%202019.pdf>

US Department of State. 2020. *Report on International Religious Freedom: Guinea-Bissau*

<https://www.state.gov/reports/2020-report-on-international-religious-freedom/guinea-bissau/#:~:text=Estimates%20of%20the%20religious%20composition,and%2022%20percent%20is%20Christian.>

Weber, Sylvain and Péclat, Martin. 2017.” A simple command to calculate travel distance and travel time”. *The Stata Journal*, 17 Number 4: 962–971

<https://journals.sagepub.com/doi/pdf/10.1177/1536867X1801700411>

World Bank. 2019. *Guinea Bissau: Qualitative Assessment of Demand Side Constraints to Access Maternal and Child Health Services*. Guinea Bissau: WB <https://documents1.worldbank.org/curated/en/985561561653405142/pdf/Guinea-Bissau->

Qualitative-Assessment-of-Demand-Side-Constraints-to-Access-Maternal-and-Child-Health-Services.pdf

World Bank. 2019. “Current Health Expenditure (% of GDP) - Guinea Bissau” <https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?locations=GW>

World Bank. 2019. *Guinea Bissau: Service Delivery Indicators Report – Health*. Guinea Bissau: WB <https://openknowledge.worldbank.org/bitstream/handle/10986/32029/Guinea-Bissau-Service-Delivery-Indicators-Report-Health.pdf?sequence=1&isAllowed=y>

World Bank. 2019. *Guinea Bissau: Unlocking Diversification to Unleash Agriculture Growth*. Guinea Bissau: WB <https://documents1.worldbank.org/curated/en/341991563831364596/pdf/Guinea-Bissau-ASA-Agriculture-sector-Report.pdf>

World Bank. 2019. *Guinea-Bissau Rural Transport Project Impact Evaluation on Rural Roads, Transport Costs, Women’s Access and Local Welfare in Guinea-Bissau*. Guinea Bissau: WB <https://thedocs.worldbank.org/en/doc/637241579711672712-0050022020/original/PolicyBriefGuineaBissauRuralTransportProject.pdf>

World Food Programme. 2022. “*Guinea-Bissau Annual Country Report 2021 Programme*” Guinea Bissau: WFP https://docs.wfp.org/api/documents/WFP-0000137866/download/?_ga=2.124949066.1173235944.1650826414-1451543269.1645979111

Yazbeck, Abdo S. and Davidson Gwatkin and Adam Wagstaff (2005) “Reaching the Poor with Health, Nutrition and Population Services”. *The World Bank: September 2005* https://www.researchgate.net/publication/280777334_Reaching_the_Poor_with_Health_Nutrition_and_Population_Services

Appendix

Appendix 1: List of Items on Health Centre Survey

Medicines	Instruments	Exams	Services
Paracetamol	Gloves	Malaria	Prenatal appointments
Ibuprofen	Masks	AIDS	Delivering
Amoxicillin	Disinfection material	Tuberculosis	Neonatal appointments
Complex B	Thermometer	Cholera	Children older than 2 appointments
Iron Supplements	Tape measure	Yellow Fever	Family planning meetings
Vitamin C	Sothoscopium	Typhoid Fever	Blood transfers
Insulin	Sphygmomanometer	COVID	Hospitalization
Fourths	Oximeter	Conjunctivitis	Vaccination - others than COVID
Cyprus	Flashlight		COVID Vaccination
Dipyron	Alcohol		
Metronidazole	Compresses		
Know	Bandages		
Zinc Sulfate	Betadine		
Clotrimazole	Tampons/dressings		
	Iodoi Solution		
	Ice		
	Cotton		
	Hydrogen Peroxide		
	Physiologic Serum		
	Burn ointment		
	Infantometer		
	Stadiometer		

Appendix 3: Logit Model Results

Dependent Variable	Delivery was at the Centre			Would give birth at Centre			Treat Child at the Centre		
	No interation			No interation			No interation		
Distance to HC	-0.170** (0.0801)	-0.201** (0.0876)	-0.251** (0.103)	-0.354*** (0.0979)	-0.376*** (0.106)	-0.436*** (0.128)	-0.360** (0.182)	-0.549** (0.215)	-0.612 (0.373)
Believes Protection	-0.645*** (0.201)	-0.616*** (0.217)	-0.764*** (0.225)	-0.711*** (0.242)	-0.668*** (0.256)	-0.653** (0.281)	-0.257 (0.423)	0.00310 (0.443)	-0.235 (0.417)
Distance^2	0.00546 (0.00472)	0.00716 (0.00511)	0.00828 (0.00592)	0.0147*** (0.00551)	0.0158*** (0.00596)	0.0189*** (0.00685)	0.0151 (0.00999)	0.0248** (0.0116)	0.0295 (0.0190)
Believes Spells	-0.0216 (0.229)	0.00190 (0.250)	0.191 (0.261)	-0.596** (0.298)	-0.754** (0.327)	-0.611* (0.313)	-2.355** (1.047)	-2.507** (1.069)	-2.219** (1.099)
Constant	0.938*** (0.308)	-0.160 (0.779)	-0.396 (0.974)	3.515*** (0.435)	2.810*** (1.002)	2.324* (1.200)	6.593*** (1.219)	5.094*** (1.722)	4.929** (2.319)
Observations	656	603	476	656	603	476	656	603	476

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

