

The Effect of Shocks on Prenatal Healthcare Choices.**HERNÁNDEZ, J.C.**

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Abstract

The lack of prenatal healthcare has been identified as an important determinant of maternal mortality, which is the leading cause of death among women of child-bearing age in the world. This paper examines the effect of both idiosyncratic and covariate shocks and other economic determinants on prenatal healthcare provider choices. The main question addressed is: "Do idiosyncratic and covariate shocks affect a woman's choice to seek prenatal care?" To answer this question this paper uses a large household data set from Madagascar. Four health care options are considered: hospital, private services, clinic, and no formal healthcare. This paper utilizes logit estimation to assess the use of formal prenatal care services and multinomial logit for the type of care chosen.

The results suggest that covariate shocks increase the likelihood of using formal prenatal care, while idiosyncratic shocks have the opposite effect. Idiosyncratic shocks reduce the demand for private clinics. Covariate shocks increase all formal healthcare. Covariate shocks may reduce inputs to women's health (e.g., food, shelter, community support) which women can try to recompense by increasing demand for formal health care. Conversely, women who face idiosyncratic shocks can substitute formal prenatal care for informal healthcare.

Keywords: Shocks, Prenatal Healthcare, Healthcare Choices, Madagascar.

Introduction

In 2012-2013, fewer than 50 percent of pregnant women in Madagascar received adequate prenatal care services, which is lower than the average for Sub-Saharan Africa. [1] Many studies linked the lack of prenatal healthcare to outcomes such as increased maternal death and child mortality. [2,3,4,5] Lack of prenatal care has also been associated with lower birth weight, [6,7,8,9] which has been related with poorer adult economic performance. [10,11,12,13]

The public health system in Madagascar has a pyramidal structure, with community-based clinics followed by district hospitals, regional hospitals, and finally university hospitals at the top. [15,16] Public clinics are staffed by nurses and/or midwives and have no doctors or surgical capacity. Most of prenatal care and deliveries are attended on public clinics. Public hospitals do have doctors and operating rooms, but there is typically only one hospital per district (located in the district capital). According to the World Bank the referral mechanism among the clinics and hospitals is ineffective. [15,16] The private health services are concentrated primarily in the capital (Antananarivo) and other urban areas. For example, around one-third of physicians in Madagascar live in the capital, but just 23 percent of the population lives there. [15,16]

In 2004 Madagascar implemented a cost recovery policy in its health system. [15,16,17] Even though the prenatal health services are not excluded from the cost recovery policy, there is an exception mechanism that allows extremely poor women to access prenatal care services. [16] Prenatal care had important effects on women's health including decreasing maternal deaths, hospitalizations, and other risk factors. [13] The preventive nature of prenatal care significantly reduced healthcare costs. [13]

So few is known on how adverse events or shocks can influence women from seeking formal prenatal care. Adverse events can affect the household's ability to afford health services and access the health provider. The reaction of the household can differ on the type of adverse event, since shocks can affect a single household or the whole community. A shock that affects the entire community may have a higher impact on the household. For example, climatic adverse event such as storms and floods can affect roads and bridges which can affect household capacity to reach the health services. If the adverse event reduce income and community support the formal prenatal care may be unaffordable and the household can substitute formal with informal care.

This paper was conducted to assess how an adverse event or shocks determine the choice of prenatal healthcare providers. Understanding the effect of adverse event and how this adverse event affect a woman's ability to access and afford formal prenatal care can be useful to counteract potential negative effects.

Literature Review

A shock is "an adverse event that generates vulnerability by the reduction in consumption, the loss of household income and/or productive assets". [14] The shock literature looks at the effects of different types of shocks (i.e., idiosyncratic and covariate or economic, climatic, political, crime, and health) on asset accumulation, consumption, or income. [18,19] For example, there is evidence that indicates that health and climatic shocks can decrease both household income and consumption. [14,19] Similarly, previous studies have found that climatic shocks decrease asset accumulation. [18]

Shocks also may affect the risk behavior of the households. Some studies suggest that households that suffer negative shocks adopt less risky behaviors. [14,20] If the household expects that a shock increases the risks for the mother, they may use prenatal care to minimize negative outcomes. Since shocks also can affect the health of the infant, a woman can use prenatal care to reduce negative outcomes. There is evidence that indicate that children that face climatic shocks have a higher likelihood of being malnourished and less likely of staying in the school. [8] Vulnerability through malnutrition can affect children's growth and adult economic performance. [21]

There is evidence suggesting that households respond differently to different types of shocks. [22] Some studies found that unemployment has a negative effect on consumption while death of a family member and climatic events has positive and significant effects. The response to a shock can vary given the capacity of the shock to affect family and community support, household mobilization, infrastructure or community services..

Methods

The primary source of data used in this paper is the Madagascar Household Survey (EPM, Enquête auprès des Ménages) for the year 2005. The 2005 EPM is a type of Living Standards Measurement Study with the objective monitoring of the future impacts of the implementation of Millennium Challenge Corporation programs. This data was gather by the National Institute of Statistic of Madagascar with the finance of USAID and

Millennium Challenge. The data collection started on September 5, 2005 and ended on November 10, 2005. These data were based on 44 strata into the 22 regions of Madagascar. Randomize 21 households were selected from a total of 561 communities. Permission to conduct the survey was obtained from National Institute of Statistic of Madagascar. Each respondent provides individual consent.

From the full sample of 11,781 households, 1,454 women between 15 and 49 years of age gave birth during the 12 months prior to the survey and are used in the analysis. Prenatal care refers to all the health services that women received in a formal health facility before giving birth. Services that the women and infants received during or after labor are

not included in this definition of prenatal care. The present paper excluded from the analysis women who had spontaneous abortions, induced abortions, stillbirths, or were still pregnant.

The survey allows for four discrete options for prenatal healthcare: (1) no formal healthcare, (2) clinic, (3) private services, and (4) hospital. The no formal care/self-treatment option includes the informal or traditional healers or doctors as well as no care whatsoever. Clinic health services refer to public clinics, while private services include private doctors, private clinics, employer-based clinics and facilities operated by NGOs. Hospital health services refer to all public hospitals in Madagascar. Other definitions are presented in Table 1.

Table 1: Description of the Variables at the Individual Level

Variable	Definition
Formal Prenatal Care	Includes the following categories: clinic health services, private health services, and hospital health services.
Hospital Health Services	Includes the following categories and hospital health services: university hospital, regional hospital, first and second level district hospital.
Private Health Services	Includes the following categories: private doctor, private clinic, employer-based clinic, and NGO.
Clinic Health Services	Includes the following categories: the concept of first and second level clinics.
Non Formal Healthcare	Includes the following categories: informal healer, informal doctor, and non-prenatal care.
Age	The age of the female.
Fever or Malaria	One if the woman suffered fever symptoms or malaria infection.
Working in Agriculture	One if the woman works in agriculture.
<i>Demographic</i>	
Married	One if the woman is legally married.
Traditional Religion	One if the woman practices traditional religion.
No Schooling- Women's Father	One if woman's father has no education.
No Schooling-Women	One if woman has no education.
Previous Births	Number of live previous births.
Wants More Children	One if the woman wants more children and does not use birth control.
Adult member Sick	One if the household reports an active adult sick in the household.
Cement Floor	One if the floor of the woman's house is cement.
No Toilet	One if the woman's house does not have toilet or latrine in the house or surrounding area.
Throw Trash Out	One if the members of the household throw the trash out of the house.
Uncovered Water Source	One if the woman's house is supplied by an uncovered source of water.
<i>Economic</i>	
Alcohol Expenditures	Share of total household expenditures on alcoholic beverage.
Cigarette Expenditures	Share of total household expenditures on tobacco.
Employer Health Benefit	One if the household head has health benefits at work.
Food Expenditures	Share of total household expenditures for food.
Expenditure	Per capita household expenditure in national currency (Ariary, the national currency).
No Schooling-Household Head	One if household head has no education.
Women Household Head	One if a woman is the head of household.
Rural	One if the woman lives in a rural area.
Idiosyncratic Shocks	Total income loss generated by an event that affect the household or some group of households in the village generating an unexpected economic problem, environment, crime, and/or health events in the previous year divided by 100,000 (Ariary).
Covariate Shocks	Total income loss generated by an event that affect the village, the commune of the district generating an unexpected economic problem, , environment, crime, and/or health events in the previous year divided by 100,000 (Ariary).

Madagascar's Household Survey does not report antenatal information for the women in these households who may have died during pregnancy or childbirth, or women who can have preterm deliveries. These two factors can generate a selection bias problem. While the survey does not report maternal death specifically or death of women in child bearing age, less than 1 percent of the households report an active adult death in the family. Also, since our sample is constrained to live births we expect the issue of preterm deliveries will be negligible. Unlike similar surveys, the Madagascar Household Survey did not ask women about the number or timing of visits.

The Madagascar Household Survey collected information on various unexpected events that negatively affected the household. The data includes the source of the shock, the scale of the shock (i.e., whether the event affected only the household, the village, the commune or the entire district) and the size of the impact on the household. This dataset also includes the scale of the shock or whether the event affected only the household, the village, the commune or the entire district.

The idiosyncratic shocks were defined as adverse events that affect the income of the household or a small group of households in the community. Conversely, covariate shocks are negative events that affect the village, the commune or the district. The value of the shock is self-reported and depends on estimates made by the household. Additionally, shocks to the household occurring in the previous year were classified in four broad categories: economic, environmental, crime, and health. Economic, environmental, crime, and health shocks that only affect the household were aggregate in a single category: idiosyncratic shocks. Furthermore, these four categories that affect the entire community were also aggregate in a one category: covariate shocks. These shocks were reported in terms of income and consumption lost. This survey also gather information on the following characteristics of the mother: the mothers' age,

marital status, education of both the mother and her father, mother's employment status, wantedness, practice of traditional religion, number of previous births, and health problems.

Data analysis was done using STATA, version 14. Two logit estimations were performed (models 1 and 2). Model 1 focuses on individual and household variables. Model 2 controls for community fixed effects. This method allow us to study whether or not a woman seeks formal care, where the dependent variable equals 1 if the woman sought formal prenatal care, otherwise zero. The logit estimation uses idiosyncratic and covariate cost and other demographic and economic independent variables. A multinomial logit model was also estimated. The multinomial logit was used to examine the choice between no formal prenatal care, public clinic, public hospital, or private facility. No formal prenatal care is the base outcome in the estimations.

Results

According to our data, around 35 percent of pregnant women did not obtain any formal prenatal health services. Women cited distance to the prenatal health facility (34%), a belief that formal care was unnecessary (20%), lack of money (19%), and poor quality of care (1%) as the primary reasons for not seeking prenatal care services. In this sample, 28 percent of women use no formal care; 51 percent chose clinic services; 5 percent used private services; and 16 percent used hospital services.

Table 2 presents selected descriptive statistics for those individuals that were affected by idiosyncratic and covariate shocks. About 38 percent of the women who used formal prenatal care suffered an idiosyncratic shock and 33 percent a covariate shock. For those women who did not use formal prenatal care, 36 percent experienced an idiosyncratic shock and 33 percent a covariate shock. Woman who used private services faced fewer idiosyncratic (26 percent) and covariate (22 percent) shocks. Reported losses due to these shocks averaged US\$270.

Table 2: Selected Descriptive Statistics of Individuals Affected by a Shock

Variable	N	Proportion of Individuals that had an Idiosyncratic Shock	Idiosyncratic Shock (Ariary)	Proportion of individuals that had a Covariate Shock	Covariate Shock (Ariary)
Formal Care	1043	0.38	214,121	0.33	251,159
Hospital	231	0.35	375,553	0.36	228,053
Private	68	0.26	267,300	0.22	207,333
Clinic	744	0.40	166,209	0.33	261,899
No formal Care	411	0.36	536,188	0.33	185,037
Age (years)	26.8501	26.7297	28.6269	26.724	26.154
Fever or Malaria (dummy)	0.0479	0.0476	0.0735	0.0457	0.0268
Working in Agriculture (dummy)	0.6405	0.5758	0.3088	0.6909	0.7056
No Schooling-Woman (dummy)	0.2293	0.2664	0.1029	0.2294	0.5463
No Schooling-Woman's Father (dummy)	0.3739	0.355	0.1618	0.3992	0.6034
Previous Deliveries (number of)	3.4247	3.1082	3.2794	3.5363	3.6399
Married (dummy)	0.2456	0.2478	0.4706	0.2242	0.076
Traditional Religion (dummy)	0.1283	0.1087	0.1471	0.1326	0.2689
Wants More Children (dummy)	0.1668	0.1515	0.0294	0.1841	0.1922
Household Level					
Adult Member Sick (dummy)	0.0796	0.0779	0.1029	0.078	0.0414
No Toilet (dummy)	0.4167	0.3696	0.2059	0.4507	0.7171
Cement Floor (dummy)	0.1803	0.2478	0.4118	0.1378	0.078
Throw Trash Out (dummy)	0.5563	0.5652	0.4853	0.5601	0.7707
Uncovered Water Source (dummy)	0.5255	0.4391	0.3235	0.5709	0.7098
Alcohol Expenditures (Ariary)	0.0002	0.0003	0.0003	0.0001	0.0002
Cigarette Expenditures (Ariary)	0.0003	0.0002	0.0003	0.0003	0.0002
Employer Health Benefits (dummy)	0.0808	0.1174	0.1765	0.0607	0.022
Food Expenditures (Ariary)	0.5086	0.5147	0.5412	0.5037	0.5057
Expenditure (Ariary)	350,989	389,630	625,340	313,818	255,533
No Schooling-Household Head (dummy)	0.206	0.1826	0.1912	0.2146	0.4585
Women Household Head (dummy)	0.0626	0.0696	0.0735	0.0594	0.0634
Rural (dummy)	0.5197	0.3261	0.1912	0.61	0.6049
Idiosyncratic Shock (Ariary)	80,269	130,061	70,755	65,679	190,470
Covariate Shock (Ariary)	82,901	81,941	45,735	86,595	61,679

Table 3 presents the results for model 1 and 2 of the logit estimations. Factors significantly associated with the choice of formal prenatal care were: fever or malaria; working in agriculture; no schooling-woman; no schooling-woman's; married; adult member sick; no toilet; throw trash out; uncovered

water source; household expenditure; no schooling-household head. Both the idiosyncratic shock and covariate shock were also significant. The estimated elasticities (marginal effect) of the idiosyncratic shocks and covariate shocks are -0.004 and 0.022, respectively.

Table 3: Logit Estimation for Use of Formal Prenatal Care Services

Dependent Variable is 1 if Formal Care is Chosen	Model 1 (Pool)		Model 2 (Fixed Effect)	
	Coeff.	Z robust	Coeff.	Z robust
Individual Level				
Age (years)	0.006	0.46	-0.017	-0.91
Fever or Malaria (dummy)	0.709***	1.80	0.602	1.18
Working in Agriculture (dummy)	0.479*	3.00	0.079	0.27
No Schooling- Woman (dummy)	-0.770*	-4.89	-0.824*	-3.96
No Schooling-Woman's Father (dummy)	-0.399*	-2.83	-0.368***	-1.89
Previous Deliveries (number of)	-0.037	-1.01	-0.010	-0.20
Married (dummy)	0.568**	2.48	0.677*	1.85
Traditional Religion (dummy)	-0.143	-0.81	-0.169	-0.55
Wants More Children (dummy)	0.046	0.27	0.085	0.32
Household Level				
Adult Member Sick (dummy)	0.665**	2.22	0.426	1.17
No Toilet (dummy)	-0.339**	-2.15	-0.516***	-1.88
Cement Floor (dummy)	0.083	0.34	0.148	0.43
Throw Trash Out (dummy)	-0.514*	-3.21	-0.544**	-2.01
Uncovered Water Source (dummy)	-0.25***	-1.70	-0.163	-0.55
Alcohol Expenditures (Ariary*)	-74.180	-1.05	-201.322	-1.21
Cigarette Expenditures (Ariary)	117.276	1.46	235.746	1.40
Employer Health Benefits (dummy)	0.460	1.11	0.764	1.15
Food Expenditures (Ariary)	0.467	1.30	0.662	1.04
Expenditure (Ariary)	0.118**	2.67	0.204*	2.51
No Schooling-Household Head (dummy)	-0.272***	-1.71	-0.202	-0.85
Women Household Head (dummy)	-0.089	-0.31	0.060	0.15
Rural (dummy)	-0.130	-0.95		
Idiosyncratic Shock (Ariary)	-0.014***	-1.76	0.013	1.32
Covariate Shock (Ariary)	0.088*	2.88	0.128*	3.90
Constant	1.101**	2.45	1.432**	2.34
N	1,420		889	
Number of communes			140	
Wald chi2	(24) 194.93		(23) 128.28	
Prob > chi2	0.0000		0.0000	
Log pseudolikelihood	716.25		-291.64	
Pseudo R ²	0.16			

*** indicates that the coefficient is significant at 10 percent level; ** (*) indicates significance at 5(1) percent level. The degrees of freedom are in parenthesis. + Ariary is the currency of Madagascar. In 2005 the exchange rate was 2003.026 Ariary per dollar

Table 4 shows the multinomial logit estimations. The multinomial estimation evaluate three formal prenatal care options: (1) clinic, (2) private services, and (3) hospital. The base outcome was no formal care. In the hospital equation the significant factors were: age; working in agriculture; no schooling-woman's father; previous deliveries; married; no toilet; throw trash out; expenditure; uncovered water source; no schooling-household head; rural; covariate shock. Factors significantly associated with the choice of formal prenatal care in private clinic were: fever or malaria; no schooling- woman; no

schooling-woman's father; married; traditional religion; wants more children; adult member sick; throw trash out ; food expenditures; household total expenditure; rural; covariate shock. In the public clinic equation the significant factors were: fever or malaria; working in agriculture; no schooling-woman; no schooling-woman's father; married; adult member sick; no toilet; throw trash out; alcohol expenditures; cigarette expenditures; household total expenditure; idiosyncratic shock and covariate shock.

Table 4: Model 1, Multinomial Logit Estimation for Type of Care Chosen

No care is base outcome	Hospital		Private		Clinic	
	Coefficient	Z Robust	Coefficient	Z Robust	Coefficient	Z Robust
Individual Level						
Age (years)	0.037**	1.97	0.036	1.27	-0.005	-0.33
Fever or Malaria (dummy)	0.647	1.26	1.579**	2.58	0.701***	1.71
Working in Agriculture (dummy)	0.613*	2.75	0.124	0.36	0.477*	2.85
No Schooling-Woman (dummy)	-0.196	-0.84	-1.599*	-2.94	-0.907*	-5.38
No Schooling-Woman's Father (dummy)	-0.503**	-2.54	-1.216*	-2.80	-0.321*	-2.17
Previous Deliveries (number of)	-0.168*	-2.98	-0.080	-0.76	0.001	0.03
Married (dummy)	0.556***	1.90	1.138*	2.87	0.524**	2.24
Traditional Religion (dummy)	-0.154	-0.55	1.225**	2.47	-0.206	-1.09
Wants More Children (dummy)	-0.151	-0.63	-1.737**	-2.31	0.160	0.89
Household Level						
Adult Member Sick (dummy)	0.585	1.52	1.203**	2.23	0.674**	2.17
No Toilet (dummy)	-0.375***	-1.65	-0.505	-1.25	-0.322***	-1.96
Cement Floor (dummy)	0.205	0.68	0.397	0.99	0.007	0.03
Throw Trash Out (dummy)	-0.408***	-1.92	-0.666**	-1.99	-0.544*	-3.29
Alcohol Expenditures (Ariary)	84.209	0.92	-51.732	-0.48	-155.695***	-1.86
Cigarette Expenditures (Ariary)	-13.433	-0.12	98.039	0.62	152.044***	1.78
Employer Health Benefits (dummy)	0.630	1.37	0.050	0.08	0.400	0.93
Food Expenditures (Ariary)	0.529	1.02	2.068**	2.20	0.381	1.01
Expenditure (Ariary)	0.136**	2.51	0.347*	4.91	0.087***	1.83
Women Household Head (dummy)	-0.056	-0.15	-0.397	-0.64	-0.074	-0.24
Uncovered Water Source (dummy)	-0.418**	-2.04	0.105	0.28	-0.221	-1.42
No Schooling-Household Head (dummy)	-0.517**	-2.02	0.645	1.46	-0.248	-1.45
Rural (dummy)	-0.984*	-4.97	-1.274*	-3.44	0.180	1.24
Idiosyncratic Shock (Ariary)	0.007	0.77	-0.004	-0.12	-0.036**	-2.31
Covariate Shock (Ariary)	0.097*	2.74	0.101**	2.27	0.087*	2.75
Constant	-0.687	-1.16	-3.863*	-3.65	0.937**	1.98
N	1,420					
Wald chi2(72)	374.21					
Prob > chi2 =	0.0000					
Log pseudolikelihood	-1362.56					
Pseudo R ²	0.15					

*** indicates that the coefficient is significant at 10 percent level; ** (*) indicates significance at 5(1) percent level.

Discussions

The results suggest that idiosyncratic shocks reduce the utilization of formal prenatal care. Idiosyncratic shocks can decrease the consumption capability of the individuals and can make them reallocate consumption to adapt to the shock. Conversely, covariate shocks increase the formal prenatal care demand. It is plausible that covariate shocks generate food insecurity, decrease community support, and reduce traditional health services. These conditions may harm women's health and force them to use formal healthcare to compensate the lack of other inputs of health.

On the multinomial logit estimations women who suffer covariate shocks are more likely to seek these three types of formal prenatal care relative to no care. However, idiosyncratic shocks are negative and significant only in the public clinic equation. This can suggest that women who confront an idiosyncratic shocks substitute formal for informal health care. Public clinics, traditional healers and traditional birth attendants are found primarily in rural areas. It is possible that in rural areas women

substitute clinics with traditional healer or traditional birth attendants.

The result of both the logit estimation and the multinomial logit estimation suggest that covariate shocks increase the utilization of all types of formal prenatal healthcare. Furthermore, those factors that can jeopardize pregnant women's health and the health of the infant (e.g., diseases in family members, or cigarettes) increase the utilization of the more affordable health services. Factors such as education and household expenditures also increase the likelihood to seek formal prenatal healthcare.

Conclusion

Consistently in all of our models we find that covariate shocks increase the likelihood of using formal prenatal care. The finding also suggests that shocks that affect the entire community may reduce inputs to women's health (e.g., food, shelter, community support) which women can try to compensate for by increasing demand for formal health care. Conversely, idiosyncratic shocks reduce the likelihood of using formal prenatal care. It is

plausible that women who face idiosyncratic shocks substitute formal prenatal care for informal healthcare. The 2030 Agenda for Sustainable Development of the United Nations highlight what it is required to reduce both infant and maternal mortality. Because maternal death and child mortality have been linked to the lack of prenatal health and delivery assistance, the targets of the 2030 Agenda for Sustainable Development include increasing the rate of prenatal care utilization. The results of this study provide some guidance on how Madagascar can reach this goal.

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