ASSESSING THE EFFECT OF THE MEANS-TESTED *PROGRAM OPORTUNIDADES* IN MEXICAN CHILD MORTALITY RATE[1]

Edgar Núñez y Carlos Farah

Abstract

This paper assesses the contribution of the means-tested program Oportunidades in reducing child mortality rate in Mexico during 2004, 2005, 2006 and 2008. We followed the methodology suggested by Gassmann and Notten (2006) and De Janvry and Sadoulet (2006) to establish to what extent certain household's characteristics and the Oportunidades benefit change the probability of occurrence of child's death within a family. Mainly, the analysis reveals the following: there is not statistical evidence to sustain that Oportunidades has shown a reducing effect over child mortality rate in Mexico.

Keywords: *Child mortality, Oportunidades Program, means-tested, cash-transfer, Mexico.*

Resumen

Este estudio evalúa la contribución del Programa Oportunidades en la reducción de la tasa de mortalidad infantil en México durante 2004, 2005, 2006 y 2008. Seguimos la metodología sugerida por Gassmann y Notten (2006) y De Janvry y Sadoulet (2006) para establecer en qué medida, ciertas características de los hogares y el beneficio de Oportunidades cambian la probabilidad de ocurrencia de muerte infantil en una familia. Los resultados principales revelan lo siguiente: No hay evidencia estadística para sostener que Oportunidades ha mostrado un efecto de reducción sobre la mortalidad infantil en México.

Palabras clave: *Mortalidad infantil, Programa Oportunidades, means-tested (prueba de medios), transferencia en efectivo, México.*

INTRODUCTION

In 2000, the Millennium Development Goals called for a reduction in child mortality rate by two thirds by 2015[3]. Of the 60 countries with the world's highest rates of infant

---

[1] This paper was written whilst authors were visiting Tilburg University (The Netherlands) as international exchange students. Authors wish to thank Prof. Dr. P. Kooreman for providing valuable support and helpful comments. All other errors remain our own. The views expressed in this paper are those of the authors and do not necessarily reflect those of Tilburg University.

[2] The ideas and opinions expressed in this document are the sole responsibility of the authors and do not necessarily reflect the perspective of the ITESM. edgar_ivan100@hotmail.com.

[3] According to UNICEF, infant mortality rate is defined as the probability of dying between birth and exactly one year of age expressed per 1,000 live births.

deaths, only Bangladesh, Brazil, Egypt, Indonesia, Mexico, Nepal and the Philippines are now on-track to achieve this target [Bryce, Terreri, Victoria, Mason, Daelmans, Bhutta, Bustreo, Songane, Samala and Wardlaw (2006), The World Bank (2006), Parra, Pulido and Ragonesi (2010)]. Moreover, by 1990 Mexico's five year mortality rate was 46 per 1,000 live births and its progress in decreasing the mortality rate to 28 per 1,000 live births in 2004 has been well documented [Sepulveda, Bustreo, Tapia, Lozano, Olaiz, Partida, Garcia-Garcia and Valdespino (2006) and Levine (2007)].

Traditionally, child mortality rate has been considered a truthful indicator of aggregate well-being: the lower the risk of death in the first years of life, the higher the level of social welfare. Various factors could impact this indicator, for instance during the first years of age, the child's health is very susceptible to both the mother's pathological conditions and the environment that surrounds him. Similarly, if the economic and sanitary resources are sufficient, and the educational level of both parents benefits the family conditions, the fragility of the newborn declines remarkably [Hobcraft, McDonald and Rutstein (1984), Mosley and Chen (1984), Hobcraft (1987), Barbieri (1991)].

Today, a large consensus of policy makers, health researchers, doctors and international organizations sustains that infant mortality constitutes a high-priority problem of health systems. In the case of Mexico, one of the main social programs that could address child mortality is *Oportunidades*, a means-tested program that works on a conditional cash-transfer scheme associated to the fulfillment of certain responsibilities from beneficiary households. Its primary objective is the reduction of extreme poverty of current and future generations[4]. For the aims of this research, the central problem consists in analyzing if the occurrence of infant mortality – newborns until one year – is decreased within beneficiary families of *Oportunidades* compared to non-beneficiary households. In other words, to test empirically if the program has contributed to reduce child mortality rate in Mexico.

Previous studies address the impact of means-tested programs on important health and nutritional indicators[5]. For instance, Rivera, Sotres-Alvarez, Habicht, Shamah and Villalpando (2004) document the short-term nutritional impact of Progresa in Mexico; Barber (2009) analyzes the increase in cesarean section associated with *Oportunidades*. In addition,

Barber and Gertler (2008) conclude that *Oportunidades* has a positive impact on parental care, which is a result of the program's capacity to encourage beneficiary women to become active and informed health consumers. Contrary, Bracamontes, Ledezma and Camberos (2011) show this program is heterogeneous and insufficient in reducing poverty.

---

[4] Experiencing poverty is directly related to inappropriate health conditions, illness and life-expectancy (Sánchez, 2008). Since *Oportunidades* brings economic incentives on education, health and nutrition, it could perfectly reduce child mortality in some way.

The term "means test" refers to a determination of whether an individual is eligible for help from the State, based upon if this individual possesses the means to do without that help. [Ravallion and Wodon (2000), Skoufias (2000), Morley and Coady (2003), Rawlings and Rubio (2005)].

For the purpose of the current research, a binary choice model was selected. Two general relationships are studied: First, do socioeconomic characteristics of households explain the probability of a child's death? Second, do beneficiary families of *Oportunidades* are less likely to experience the loss of a newborn? Whether the answer is "yes" or "no" to both questions, the results might say something about which households have a direct impact over infant mortality. Thereafter, assessing the effect of *Oportunidades* should be directly related to social, economic and demographic characteristics of the region where beneficiary families are located.

Our study is an application of the approach developed by Gassmann and Notten (2006) and De Janvry and Sadoulet (2006) to the Mexican case. The empirical evidence resulting from this research will be the first of its type because the contributions of *Oportunidades* have been analyzed with different approaches and not directly related to child mortality. The method we use is a Multivariate Probit model by Maximum Likelihood. We used cross-section data for 2004, 2005, 2006, and 2008 from the National Survey of Income-Expenditure of Households (ENIGH) elaborated by the National Institute of Statistics and Geography (INEGI) of Mexico[6].

The primary motivation of this study focuses on the idea that *Oportunidades*, a means-tested program against poverty, could reduce the probability of infant's death within families that receive the program's cash-transfers. Mainly because these households might use the additional resources to improve both health and nutritional standards of its members. Therefore, we tested this idea and our main results were the following: both the household's income and the expenditure on food are negatively correlated with the occurrence of child's death. More educated mothers also reduce the probability of infant mortality within the family, however the effect of unemployed members is not clear enough to draw conclusions. Contrary to what we expected, the estimated effect of *Oportunidades* is almost always positive, which means it increases the probability of occurrence of child's death. However, not all outcomes related to the beneficiary status are statistically significant.

This research is structured in five sections. Section 2 gives a general description of *Oportunidades* and relevant information of the health system in Mexico. Section 3 contains the description of the model, variables and data used for the analysis. Section 4 presents the empirical results. Finally, Section 5 brings the conclusions and possible extensions.

THE MEXICAN MEANS-TESTED PROGRAM FOR POVERTY REDUCTION

The Mexican Health Care System is provided by a combination of private insurers and

---

[6] A panel data analysis would be more desired because it could achieve two purposes: 1) to differentiate between the "selection effect" of the program and the "isolated effect" over child mortality rate, and 2) to distinguish between selection and causation effects through a difference-in-difference analysis. However, ENIGH survey does not formally track families over years and this wouldn't allow to control fixed effects with the available data.

public programs. According to INEGI, more than 80 million people were insured by public entities in 2007, which represents around 80% of the population. The main public health institutions of the system are IMSS (*Instituto Mexicano del Seguro Social*), ISSSTE (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*) and Seguro Popular. IMSS is the biggest institution, enrolling in this program is mandatory for every formal worker[7]. ISSSTE is the entity that brings social security to the government's workers, it has around 11 million beneficiaries. Seguro Popular is the newest public program, it aims to provide health services to low-income population through semipublic insurance. Participation in this program is voluntary. However, its coverage has increased since its first years reaching more than 20 million in 2007. The beneficiaries of this program have access to surgery, pharmaceutical and hospital services provided by the government. Nevertheless, although public insurance in Mexico has an extensive coverage it suffers of serious problems related to quality and efficiency standards.

In 1997, during the administration of President Ernesto Zedillo, the Mexican government started to implement public policy engagements to improve quality of life and reduce poverty through a social program called Progresa. The plan started as a cash-transfer given to poor families living in rural areas. In 2002, President Vicente Fox, a different political-party administration, made some incorporations and changes to the program and decreed *Oportunidades* as a national means-tested program based on conditional cash-transfers to household's mothers to combat extreme poverty.

Today, the program delivers incentives for better living conditions through three components: education, health and nutrition. It aims to develop capacities over extreme poor families because these are the ones who suffer the highest levels of undernourishment and basic curable diseases, in addition to drop-out from school. The economic incentives provided to the beneficiaries help the families and their children to improve their nutritional and health levels because they can eat healthier and receive medical attention.

The Ministry of Health coordinates the health component of the program using three strategies. The first strategy centers on the provision of the free "Guaranteed Basic Package of Health", which includes not only preventive medical attention and health examinations, but also emergency services brought by the medical units of the Ministry of Health and IMSS-*Oportunidades*. The second strategy emphasizes on the monitoring of the nutritional state of beneficiary population, especially children from the conception stage to the age of five and pregnant women until they reach breastfeeding. This plan follows the early identification of nutritional problems through a monthly medical appointment, which consists on taking anthropometric measures of the children, inspecting the evolution of women's pregnancy, and providing nutritional supplements (Nutrisano® and/or Nutrivida®) if needed. The third strategy focuses on the promotion of health self-care throughout advertising and communitarian workshops on health care.

---

[7] The worker's daily salary determines the fees that have to be paid by the worker and the employer. The program gives coverage of labor risks, sickness, and maternity.

The criterion to select beneficiary families into the program is objective, transparent and unique (SEDESOL, 2011). The selection methodology considers the socioeconomic and demographic characteristics of households, its regional environment and residential condition (urban or rural) through a model of discriminant analysis. Basically, this method summarizes all the characteristics of households into a numerical indicator. This is the way in which information about families is taken into account for incorporation into *Oportunidades*.

In general, the program gives a strong motivation to improve the state of health of children. It has been considered a facilitator for national health campaigns because it attracts a big amount of low and medium-income families, some examples are: the implementation of universal vaccinations, the clean water national program, the "national health weeks" focused on child health, general anti-parasite treatments, respiratory infection prevention and treatments, and nutrition programs in general. Policy actions like these ones have been estimated to reduce child mortality rate in Mexico by 64 percent and the proportion of underweight children by 43 percent from 2001 to 2006 (UNICEF, 2006).

An important aspect of *Oportunidades* is the size of its beneficiary population. The program's coverage was extended vertiginously to reach all the municipalities of the country (Table 1). Five million households were reached during 2004, thenceforth the total beneficiary entities has increased. Mainly, the entrance of new families has been related to the exits of benefit households and the increase of the program's budget.

Table 1. Historical Coverage of *Oportunidades* (Progresa)

Year	States	Municipalities	Local Entities	Households
1997	12	456	10,789	300,705
1998	30	1,485	34,414	1,595,604
1999	31	1,986	48,719	2,306,325
2000	32	2,166	53,232	2,476,430
2001	32	2,310	67,539	3,116,042
2002	32	2,354	70,520	4,240,000
2003	32	2,360	70,436	4,240,000
2004	32	2,429	82,973	5,000,000
2005	32	2,435	86,091	5,000,000
2006	32	2,441	92,672	5,000,000
2007	32	2,444	92,961	5,000,000
2008	32	2,445	95,819	5,049,206
2009	32	2,445	97,922	5,209,359
2010	32	2,445	97,053	5,818,954

NOTES: 1/ Data from 1997 to 2001 under Progresa.
             2/ Data from 2002 to 2010 under *Oportunidades*.

SOURCE: **SEDESOL-Oportunidades**. Historical Time Series of Coverage on States,
             Municipalities, Local Entities and Beneficiary Families, 2010.

According to the Ministry of Finance the program takes care of about 5.8 million households, which represents 22.7% of the Mexican families registered in the Second Count of Population conducted by INEGI. The beneficiary families are distributed in 97,053 local entities of 2,445 municipalities of the 32 Mexican states (Table 2). From these, 78.5% are located in entities with more than 15,000 people. Moreover, in 2010 the

total budget associated to *Oportunidades* accounted for more than $62,335 million of Mexican pesos, this meant a real growth of 23.3% over the budget approved in 2009, equivalent to an additional budget of $14,400 million of Mexican pesos (SHCP, 2010).

Table 2. Coverage of *Oportunidades* by Federal Entity, 2010

	State	Municipalities	Local Entities	Households
	TOTAL	*2,445*	*97,053*	*5,818,954*
1	Aguascalientes	11	823	30,288
2	Baja California	5	564	43,322
3	Baja California Sur	5	1,142	17,981
4	Campeche	11	699	61,206
5	Coahuila	38	1,219	60,901
6	Colima	10	246	22,500
7	Chiapas	118	8,824	622,709
8	Chihuahua	67	3,342	87,858
9	Distrito Federal	6	112	23,512
10	Durango	39	2,728	94,095
11	Guanajuato	46	5,240	242,787
12	Guerrero	81	5,545	389,802
13	Hidalgo	84	4,003	230,510
14	Jalisco	124	5,359	171,219
15	México	125	3,774	462,465
16	Michoacán	113	5,948	284,663
17	Morelos	33	785	85,570
18	Nayarit	20	1,022	45,337
19	Nuevo León	51	2,469	67,920
20	Oaxaca	570	6,816	436,535
21	Puebla	217	4,892	485,250
22	Querétaro	18	1,545	75,783
23	Quintana Roo	9	586	60,241
24	San Luis Potosí	58	4,929	209,906
25	Sinaloa	18	3,400	134,630
26	Sonora	72	1,150	86,872
27	Tabasco	17	1,888	170,998
28	Tamaulipas	43	2,240	116,434
29	Tlaxcala	60	546	74,524
30	Veracruz	212	11,326	664,773
31	Yucatán	106	1,182	152,597
32	Zacatecas	58	2,709	105,766

SOURCE: SEDESOL-Oportunidades. Historical Time Series of Coverage on States, Municipalities, Local Entities and Beneficiary Families, 2010.

It has become essential for policy makers in Mexico to count on specialized information that could allow the formulation, execution and evaluation of this program. According to Sepulveda et al. (2006), the next challenge for Mexico in terms of the scope of *Oportunidades* and general health care system is to reduce the deaths in the neonatal period by fighting birth asphyxia and trauma, congenital heart anomalies and low birth weight since these are the main causes of childhood mortality in the country.

THE MODEL

Most of the external evaluations of *Oportunidades* have been well targeted by using socioeconomic characteristics with controlled groups. By consequence, the line of reasoning of almost all these studies haven't been other than the comparison of the treatment families against the controlled ones. Our research goes further by explaining the effect of the program using a probability model that recognizes the household's needs, resources, behavior, benefits and how all these relate to Mexico's child mortality rate. Therefore, the general hypothesis of this study can be stated as follows: *Has Oportunidades presented any contribution to reduce Mexican child mortality rate since its implementation?*

Data: We retrieved data of 1,504 Mexican families randomly chosen for each ENIGH survey year. This sample is significant because it represents the families that can affect child mortality rate; that is, households that present childbirths. The years we covered are 2004, 2005, 2006 and 2008 in order to evaluate the impact of *Oportunidades* and not that of Progresa. Table 3 brings the definitions of the variables we analyzed.

Table 3. Variables of the Probit Model

Variable	Description
Y	**Occurrence of Child's Death**. Takes the value of 1 when a more than 12-year female member of the family answered "Yes" to the following question: *From your newborn children, has any of them died?*
IN	**Monetary Income**. Measured in Mexican pesos; it gives the total quaterly monetary income that is obtained by all the household's members. It does not include nonmonetary transferences neither from the government nor from a non-governmental agency.
RURAL	**Rural Entity**. Dummy variable that takes the value of 1 when the family home is located in an area with less than 2,500 inhabitants. Otherwise, it takes the value of 0.
EPF	**Expenditure on Food**. Measured in Mexican pesos; it gives the family's total monthly expenditure on foods and beverages inside home. It does not include any food expenditure paid with banking and/or commercial cards.
MEDU	**Mother's Educational Level**. Dummy variable that takes the value of 0 when the mother of the newborn hasn't reached elementary education, it takes the value of 1 when the mother has achieved at least elementary education, it takes the value of 2 when the mother has reached at least secondary education, and it takes the value of 3 when the mother has achieved more than secondary education.
UN	**Unemployment in Household**. Dummy variable that takes the value of 1 when at least one member of the family is economically active and is unemployed. Otherwise, it takes the value of 0.
Oportunidades	**Oportunidades Beneficiary**. Dummy variable that takes the value of 1 if the household is a direct beneficiary of *Oportunidades* program and a value of 0 if it is not.

SOURCE: INEGI. National Survey of Income-Expenditure of Households (ENIGH).

The selection of the variables is closely related to the literature and empirical evidence on infant mortality. According to UNICEF, by 2003 under nutrition was estimated to be an underlying cause in up to 54% of all under-one year deaths. Moreover, Smith and Haddad (1999) explain that due to poverty, per-capita food availability has an inverse impact over children deaths because higher family income provides better chances of reducing child malnutrition. Moreover, improvements in women's education was found to have

contributed significantly in reducing child mortality [Ware (1984); Cleland and van Ginneken (1988); Caldwell and McDonald (2004)]. On the other hand, the influence of family unemployment is controversial. While some authors suggest a positive relation to take place between these variables [Murphy, Dauncey, Newcombe, Garcia and Elbourne (1984), Raatikainen, Heiskanen and Heinonen (2006)], other ones state that the more unemployed members within a household the less risky pregnancy outcomes would appear [Najman, Morrison, Williams, Keeping and Andersen (1989); Henriksen, Savitz, Hedegaard and Secher (1994)]. We look for statistical evidence of the following: *if the family is beneficiary of Oportunidades and it hasn't experienced the death of a newborn, the program could have contributed to reduce the occurrence of child mortality.*

RESULTS

Our estimation approach is simple: for each cross-section we use Probit regressions to estimate four models. Table 4 shows the estimation results in marginal effects indicating the change in the probability for a small change in each independent variable. We only include households that have the presence of a newborn since these are the ones that have a direct impact on infant mortality rate. As expected, the household income is negatively correlated with the occurrence of child's death in Models 1 and 2. On average, the likelihood of having the presence of child's death with additional income decreases by 8.0% in 2004, 9.3% in 2005 and 2006, and 7.5% in 2008. Additionally, expenditure on food in Models 3 and 4 shows a negative correlation with the dichotomizing variable, this is statistically significant at a 5% level at least.

Model 1 is the baseline for our analysis. It gives an insight about the socioeconomic status of households: higher incomes are expected to bring better quality health services and appropriate expenditure on food within a family, which could have a direct impact over child mortality. Similarly, the *RURAL* dummy provides information about the access that Mexicans households have to medical services and economic resources in their community. The results are as follows: the coefficient for household's income is negative and significant at a 1% level in all of the years. Hence, the probability of occurrence of child's death in a family is decreased *per se* by this indicator. Moreover, households living in rural areas are more probable to present a child's death, thus increases child mortality rate. This is shown for all survey years.

Model 2 incorporates the dummy variable *Oportunidades* to assess the program's effect on infant mortality. Family's income maintains the same relation with binary *Y* as in the previous model. The marginal effect of *RURAL* is still positive, but it only shows a good significance during 2004 and 2006. The economic interpretation for this variable might be the same as explained in Model 1. More important, the coefficients for the dummy *Oportunidades* are positive in the first three years and significant at a 1% level in 2005 and 2006. This is relevant because it would state that being beneficiary of the program actually increases the probability of occurrence of infant death, which contradicts our hypothesis. Nevertheless, for the year 2008, this outcome is negative and not statistically significant.

Model 3 analyzes the family expenditure on food and the *RURAL* variable[8]. It also takes into account the education level of the family mother and the presence of unemployment within the household. As expected, increases in expenditure on food decreases the likelihood of infant death. The marginal effects are estimated to be around -0.03% in 2004, -0.32% in 2005, -0.04% in 2006 and -0.16% in 2008. Although the values of this coefficient are statistically significant, they are very small. This is logical in the sense that an additional $1 Mexican peso spent on food within a family cannot affect in a large proportion the probability of child's death. However, larger amounts on food expenditure could notoriously have an impact. The dummy *RURAL* presents a positive correlation, varying from 12% to 20%. On the other hand, the mother's educational level is estimated to negatively affect child's death. For example, in 2004 the likelihood of occurrence of *Y* is estimated to be decreased by 12% when the family mother does not have primary education, and by 53% and 67% when she has reached primary and secondary education, respectively. In general, the same trend is shown in all years. Lastly, unemployment is not significant at any level. However, the inclusion of this variable is intuitively important because it probably takes into account additional information about the economic status of families that any other variable does not.

Finally, our most unrestricted specification is given by Model 4, which incorporates the *Oportunidades* dummy. Expenditures on food have almost exactly the same statistical characteristics as in Model 3. The dummy variable *RURAL* presents a positive relation, which is significant at a 5% level in the first three years. Essentially, the coefficients associated to the dummies for the mother's educational level and the unemployment within the household present very similar patterns as those in Model 3. However, the marginal effects of the mother's education variable are mostly higher than previously. On the other hand, the coefficients for *Oportunidades* are all positive and most of them significant. The likelihood of having the presence of child's death within a beneficiary family of the program would actually increase by 11% in 2004 to 20% in 2008, for example.

---

[8] Models 1 and 2 differ from Models 3 and 4 in the sense that the first ones evaluate total income and the second ones target the expenditure on one relevant specific component for this study: food (nutrition).

Table 4. Probit Regressions on Cross-Sections
(Occurrence of Child's Death, Yes=1/No=0)

	2004	2005	2006	2008
# of households	1,504	1,504	1,504	1,504
Model 1				
Log income before *Oportunidades* benefit	-0.0802	-0.0937	-0.0932	-0.0756
	(0.0042)	(0.0045)	(0.0044)	(0.0040)
Household living in rural area	0.1689	0.1886	0.3170	0.0505
	(0.0767)	(0.0773)	(0.0758)	(0.0791)
Model 2				
Log income before *Oportunidades* benefit	-0.0805	-0.0961	-0.0960	-0.0756
	(0.0042)	(0.0046)	(0.0045)	(0.0041)
Household living in rural area	0.1509	0.0873	0.1649	0.0510
	(0.0806)	(0.0868)	(0.0880)	(0.0921)
Household is a beneficiary of *Oportunidades*	0.0946	0.2534	0.3389	-0.0011
	(0.1279)	(0.0961)	(0.0967)	(0.1018)
Model 3				
Expenditure on food	-0.0003	-0.0032	-0.0004	-0.0016
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Household living in rural area	0.1663	0.1656	0.2084	0.1239
	(0.0808)	(0.0810)	(0.0818)	(0.0896)
Mother has less than primary education	-0.1235	-0.5205	-0.2143	-0.4822
	(0.2300)	(0.1903)	(0.0969)	(0.2072)
Mother has primary education	-0.5318	-0.7784	___a	-0.7898
	(0.2355)	(0.0749)		(0.1353)
Mother has secondary education	-0.6750	-0.6834	-0.3754	-0.7234
	(0.0701)	(0.3026)	(0.1475)	(0.0690)
Mother has more than secondary education	___a	___a	-0.6867	___a
			(0.0766)	
At least one unemployed person	-0.1648	0.1928	-0.1746	-0.0200
	(0.2456)	(0.2518)	(0.2720)	(0.1946)
Model 4				
Expenditure on food	-0.0003	-0.0031	-0.0003	-0.0014
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Household living in rural area	0.1503	0.0822	0.1099	0.0829
	(0.0833)	(0.0884)	(0.0893)	(0.0939)
Mother has less than primary education	-0.1227	-0.7062	-0.1885	-0.4755
	(0.2301)	(0.2051)	(0.5502)	(0.2073)
Mother has primary education	-0.6150	-0.8105	___a	-0.9509
	(0.2573)	(0.0763)		(0.1731)
Mother has secondary education	-0.6803	-0.7157	-0.6104	-0.7362
	(0.0704)	(0.3061)	(0.1690)	(0.0697)
Mother has more than secondary education	___a	___a	-0.7266	___a
			(0.0781)	
At least one unemployed person	-0.1697	0.1366	-0.1959	-0.0337
	(0.2456)	(0.2530)	(0.2713)	(0.1946)
Household is a beneficiary of *Oportunidades*	0.1137	0.2534	0.3138	0.2001
	(0.1404)	(0.1041)	(0.1101)	(0.1348)
F-test on joint significance of primary sampling units, critical value (P-value)	61.73 (0.0000)	76.61 (0.0000)	71.44 (0.0000)	62.08 (0.0000)

Models are estimated with households that have the presence of a newborn.
Robust standard errors in parenthesis.
a / Denotes omitted dummy variable.

SOURCE: **Own calculations** based on ENIGH (INEGI).

CONCLUSIONS

Demographic and healthy characteristics are considered to affect the daily life of a nation. Particularly, indicators such as infant mortality rate are considered a high-priority drawback over the health conditions of a country. In general, a society with a low child mortality rate is viewed as being healthier than one in which this rate is high (UNDP, 2005).

In this study we analyzed the means-tested program *Oportunidades*, designed to combat poverty, to prove whether it has contributed to reduce infant mortality rate in Mexico or not. Taking into account the different methodologies on assessing efficiency of means-tested programs, we followed the technique suggested by Gassmann and Notten (2006) and De Janvry and Sadoulet (2006) since it allowed us to analyze the social, economic and demographic characteristics of households, as well as the benefits of the program in a probabilistic manner.

Our analysis resulted in three general conclusions. First, according to the estimated marginal effects of the dummy variable *Oportunidades* in Models 2 and 4, the program has not made any impact to reduce the occurrence of infant mortality in Mexico. Apparently, being a beneficiary of the program would actually increase the probability of child's death. However, we may point out that not all of these estimates are statistically significant. Therefore, we can attest that *there is not enough statistical evidence to sustain that Oportunidades program has contributed to reduce child mortality rate in Mexico*.

Second, targeting the contribution of the program's components may bring better results than analyzing the complete program itself. For example, cash-transfers given to households could be used to improve infant and pregnant women's nourishment through a more comprehensive expenditure on food. This idea is supported by the coefficients of such variable in Models 3 and 4. All of these resulted negative and significant for all the years.

Third, as theory suggested, the educational level of the mother resulted to be an important element to reduce infant mortality rate [Ware (1984); Cleland and van Ginneken (1988); Caldwell and McDonald (2004)]. This has many lines of reasoning: a more educated mother would be better prepared to deal with any problematic situation related to her health during pregnancy or during the first days of her newborn. Additionally, more education enables mothers to take better decisions over expenditures within the households. Besides, we related this characteristic with *Oportunidades* because in the long run future mothers will be better educated, and this could reduce infant mortality rate for the coming years.

The main drawback of our study is the following: since a formal track of households' characteristics (micro data) through the years is not possible given the available data, a more integrated analysis using panel data was not possible to accomplish. This would have enabled us to control for two effects of the program, selection and causation.

REFERENCES

Barber (2009). Mexico's Conditional Cash Transfer Programme Increases Cesarean Section Rates Among the Rural Poor. *European Journal of Public Health*, 20(4), 383-388.

Barber and Gertler (2008). Empowering Women to Obtain High Quality Care: Evidence from an Evaluation of Mexico's Conditional Cash Transfer Programme. *Health Policy and Planning*, 24: 18-25.

Barbieri (1991). The Socio-economic and Cultural Context of Infant and Child Mortality in Sub-Saharan Africa. Proceedings of the Demographic and Health Surveys World Conference, August 3-5, Washington, D.C., vol. 1:155-176.

Bracamontes, Ledezma and Camberos (2011). The Effect of Oportunidades on Poverty in Mexico and the Northern Region, 2000-2006. *Economía, Sociedad y Territorio*, 11(35), 41-93.

Bryce Terreri, Victoria, Mason, Daelmas, Bhutta, Bustreo, Songane, Samala and Wardlaw (2006). Countdown to 2015: Tracking Intervention Coverage for Child Survival. *The Lancet*, 368: 1067-1076.

Caldwell and McDonald (2004). Influence of Maternal Education on Infant and Child Mortality: Levels and Causes. *Health Policy and Education*, 2(3), 251-267.

Cleland and van Ginneken (1988). Maternal Education and Child Survival in Developing Countries: The Search for Pathways of Influence. *Social Science & Medicine*, 27(12), 1357-1368.

De Janvry and Sadoulet (2006). Making Conditional Cash Transfer Programs More Efficient: Designing for Maximum Effect of the Conditionality. *The World Bank Economic Review*, 20(1), 1-29.

Gassmann and Notten (2006). Size Matters: Targeting Efficiency and Poverty Reduction Effects of Means-Tested and Universal Child Benefits in Russia. *Journal of European Social Policy*, 18(3), 260-274.

Henriksen, Savitz, Hedegaard and Secher (1994). Employment during Pregnancy in relation to Risk Factors and Pregnancy Outcome. *Br J Obstet Gynaecol*, 101(10), 858-865.

Hobcraft (1987). Does Family Planning Save Children's Lives? WHO Technical Background Paper prepared for the International Conference on Better Health for Women and Children through Family Planning held in Nairobi, Kenya, October 5-9, 1987 sponsored by IPPF, the Population Council, UNCHF, UNDP, UNFPA, and The World Bank.

Hobcraft, McDonald and Rutstein (1984). Socio-economic Factors in Infant and Child Mortality: A Cross-national Comparison. *Population Studies*, 38: 193-223.

Levine (2007). Improving the Health of the Poor in Mexico. In: Levine (editor 2007). Case Studies in Global Health: Millins Saved. *Jones & Bartlett Publishers*, Sudbury, MA.

Morley and Coady (2003). From Social Assistance to Social Development: Targeted Education Subsidies in Developing Countries. Washington, D.C.: International Food Policy Research Institute.

Mosley and Chen (1984). An Analytical Framework for the Study of Child Survival in Developing Countries. *Population and Development Review*, 10: 22-45.

Murphy, Dauncey, Newcombe, Garcia and Elbourne (1984). Employment in Pregnancy: Prevalence, Maternal Characteristics, Perital Outcome. *Lancet*, 1: 1163-1166.

Najman, Morrison, Williams, Keeping and Andersen (1989). Unemployment and Reproductive Outcome: An Australian Study. *Br J Obstet Gynaecol*, 96(3), 308-313.

Parra, Pulido and Ragonesi (2010). Crisis Económica Mundial y Mortalidad Infantil. *Revista Latinoamericana de Desarrollo Humano PNUD,* No. 66.

Raatikainen, Heiskanen and Heinonen (2006). Does Unemployment in Family affect Pregnancy Outcome of High Quality Maternity Care? *BMC Public Health* and Department of Obstetrics and Gynaecology, Kuopio University Hospital.

Ravallion and Wodon (2000). Does Child Labor Displace Schooling? Evidence on Behavioral Responses to an Enrollment Subsidy. *The Economic Journal*, 110(462), 158-175.

Rawlings and Rubio (2005). Evaluating the Impact of Conditional Cash Transfer Programs. *The World Bank Bank Research Observer*, 20(1), 29-55.

Rivera, Sotres-Alvarez, Habicht, Shamah and Villalpando (2004). Impact of the Mexican Program for Education, Health and Nutrition (Progresa) on Rates of Growth and Anemia in Infants and Young Children. *Journal of the American Medical Association*, 291(21), 2563-2570.

Sánchez (2008). Padecer la Pobreza: Un Análisis de los Procesos de Salud, Enfermedad y Atención en Hogares Indígenas y Rurales bajo la cobertura del Pograma Oportunidades, Book 2, in: A Diez Años de Intervención: Evaluación Externa del Programa Oportunidades en Zonas Rurales (1997-2007). Ministry of Social Development (SEDESOL).

SEDESOL (2011). Reglas de Operación del Programa de Desarrollo Humano Oportunidades. Presented in Diario Oficial de la Federación Mexico, December version.

Sepulveda, Bustreo, Tapia, Lozano, Olaiz, Partida, Garcia-Garcia and Valdespino (2006). Improvement of Child Survival in Mexico: The Diagonal Approach. *The Lancet*, 368: 2017-2027.

SHCP (2010). Presupuesto Ciudadano 2010: ¿En qué Gasta tu Dinero el Gobierno? Prepared for the Congreso de la Union in Mexico, Presupuesto de Egresos de la Federación, Mexico.

Smith and Haddad (1999). Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis. Washington, D.C.: International Food Policy Research Institute.

Skoufias (2000). Is Progresa Working? Summary of Results of an Evaluation by IFPRI. Washigton, D.C.: International Food Policy Research Institute.

The World Bank (2006). Global Monitoring Report 2006 Millenium Development Goals: Strengthening Mutual Accountability, Aid, Trade and Governance. Washington, DC.

UNDP (2005). International Cooperation at a Crossroads: Aid, Trade and Security in an Unequal World. *Human Development Report 2005*, United Nations, Washington, DC.

UNICEF (2006). Progress for Children: A Report Card on Nutrition. New York, NY.

Ware (1984). Effects of Maternal Education, Women's Roles, and Child Care on Child Mortality. *Population and Development Review*, 10: 191-214.