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# The Under-Registration of Births in Latin America

by

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# Abstract[*]

Approximately 14 percent of births are unregistered in Latin America according to estimates by UNICEF (2001).  Children who lack an official birth certificate can be denied access to social services, including enrolling in school and accessing health services.  This paper examines the under-registration of births in six Latin American countries—Bolivia, Brazil, Colombia, the Dominican Republic, Peru, and Nicaragua—using Demographic and Health Surveys (DHS).  Under-registration of children younger than 5 is found to range from 8.4 percent in Peru to 25.8 percent in the Dominican Republic.  Striking regional differences are found in all six countries.

The econometric analysis considers a simple set of covariates representing child's characteristics, parents' characteristics, household characteristics and community-level characteristics for Bolivia, Brazil, Colombia, Peru, and Nicaragua.  Children from low socioeconomic backgrounds face the greatest risks of being unregistered from birth to age 5.  The probability of a birth being registered is also shown to vary by area of residence, as well as certain characteristics of the pregnancy and delivery.  Mothers who received no prenatal care are at higher risk of having unregistered births in all five countries included in the econometric analysis.  The age of the mother is an important explanatory factor, with children born to teen mothers significantly more likely to be unregistered in Bolivia, Colombia, and Peru.  Births that were not attended by a health specialist are significantly more likely to be unregistered in Colombia and Nicaragua.  The results suggest a potential for program interventions to be effectively combined in ways such as promoting birth registration in programs designed to increase prenatal care and attended births among women with low socioeconomic status.

# 1. Introduction

Approximately 14 percent of births are unregistered in Latin America according to United Nations estimates (UNICEF, 2001). The lack of a birth certificate is often the first step of a lifelong struggle with a lack of documentation. Without proper documents children can be denied access to social services including enrolling in school and accessing health services. Undocumented children are also at a higher risk for illegal adoption and trafficking. Without written proof of one's birth it is extremely difficult to attain national identity documents at later ages. For adults in Latin America basic identity documents are vital for opening bank accounts, voting, holding a formal sector job, owning property and receiving social services. The lack of proper documentation has a direct bearing on an individual's ability to fully participate in society.

The under-registration of births also poses significant problems for the accurate estimation of indicators such as infant mortality rates. Governments and donors continue to focus a great deal of attention and resources on monitoring progress achieved toward the UN Millennium Development Goals. However, if vulnerable populations are more likely to be excluded from birth or death registration, then aggregate indicators will be biased. Palloni and Arias (2004) demonstrate the bias induced in US mortality rates by the "disappearance" of Mexican immigrants from US death registries. The under-registration of deaths, explained by return migration to Mexico, explains a large share of the differential mortality rates between Mexicans and non-Hispanics in the US. Along with the importance for monitoring progress and assessing an overall picture, accurate vital statistics are critical for providing disaggregated information that can be used to target interventions. Given inaccurate vital statistics, social programs may also be biased and hence inefficient.

UNICEF has long recognized the importance of birth registration and has supported campaigns and programs to increase birth registration globally.[1] In Latin America, governments such as those of Brazil and Bolivia have initiated recent reforms that include removing the registration fees for children under specific ages.[2] However, surprisingly little research exists on this important topic, and publications commonly lament the lack of available and reliable data. For example, a 2002 report by the Inter-American Children's Institute notes "the difficulties in

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[1] For example, UNICEF aired the following radio spots in Brazil in 2003: certidao_ago_1.mp3, available at: http://www.unicef.org/brazil/radio.htm.
[2] Brazil undertook reforms in 1997, and Bolivia in 2004.

obtaining information on birth registration and, even when information was obtained, of its suspicious validity and precision." The topic of "citizenship," commonly explored in terms of the rights and responsibilities of individuals with respect to the state, often ignores the link to under-registration, although it has diret implications on the probability of voting and other commonly measured forms of political participation (Lloyd, 2005). However, some available data appear to have been underutilized. For example, although questions on birth certificate registration are frequently included in the Demographic and Health Survey questionnaires for Latin America, a literature review reveals no published papers examining this outcome. The exception is a recent paper by UNICEF (2005) that analyzes data from 69 countries using both the DHS and MICS data.[3] While the UNICEF paper gives a global overview of the issue and summary statistics for individual countries, it largely focuses on Africa; our paper presents detailed country-specific multivariate results for five Latin American countries, which can better inform policy interventions at the national and sub-national level.

This paper examines the under-registration of births in six Latin American countries: Bolivia, Brazil, Colombia, the Dominican Republic, Peru, and Nicaragua. One standard measure for the lack of registration is the lack of a registered birth certificate for the child.[43] Section 2 describes the data, which are drawn for each country's Demographic and Health Surveys (DHS). Section 3 presents the magnitude of under-registration across the six countries and across categories such as region, sex of child and socioeconomic characteristics of the household. Section 4 examines the variables associated with under-registration using probit regressions, and Section 5 considers how recent policy interventions are related to the results from the econometric analysis.

## 2. Description of Data

Our analyses for all six countries are based on the most recent data from the publicly available Demographic and Health Surveys (DHS), nationally representative household surveys conducted in 70 countries worldwide and in 13 Latin American and Caribbean countries

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[3] The recommended indicator is described inhttp://unstats.un.org/unsd/indicatorfoc/indsearchpage.asp?cid=54.
[4] A few months after presenting a previous version of this paper at an academic conference, we became aware of independent work on birth registration by UNICEF (2005).

(http://www.measuredhs.com). The sample characteristics for each country are summarized in the table below.

**Table 1. Sample Survey Characteristics**

| Country | Bolivia | Brazil | Colombia | Dom. Rep. | Nicaragua | Peru |
|---|---|---|---|---|---|---|
| Survey/Year | DHS 2003 | DHS 1996 | DHS 2000 | DHS 2002 | DHS 2001 | DHS 2000 |
| **Sample details:** | | | | | | |
| total households | 19,207 | 13,283 | 12,659 | 27,135 | 11,328 | 28,900 |
| # women 15-49 years | 17,654 | 12,612 | 11,585 | 23,384 | 13,060 | 27,873 |
| # children under age 5 | 9384 | 5045 | 4560 | 11,260 | 8,133 | 13,697 |
| % rural | 39.8 | 20.8 | 28.7 | 43.4 | 43.0 | 36.3 |

The question pertaining to birth certificate registration is asked slightly differently in the five countries of focus, depending largely on key differences in their legal birth registration systems (see Appendix 1 for exact question wording). For example, Bolivia, the Dominican Republic and Nicaragua ask whether the child has an officially registered birth certificate, Peru asks whether the child was registered in the municipality, and Colombia asks questions regarding both the birth certificate and birth registration, while Brazil asks only whether the child has a birth certificate.

Data on birth registration are collected through surveys where specific questions are asked about the registration of the child and/or the availability of the birth certificate. While a "best practice" for collecting birth certificate registration information has not yet been universally accepted, UNICEF has established a development indicator for its Multiple Indicator Cluster Survey that measures the percentage of children less than five years of age that were registered at the time of the survey. The numerator of this indicator includes children whose birth certificate was seen by the interviewer *or* whose mother or caretaker says the birth has been registered. Our measure of under-registration for each country is consistent with UNICEF's recommendation for constructing the indicator.

## 3. Magnitudes of Under-Registration

We find that overall lack of birth certificate registration varies from 8.4 percent in Peru to 25.8 percent in the Dominican Republic. Differences in registration by the sex of the child are not statistically significant for any of the countries, with the exception of Brazil, where girls are more likely to be registered than boys. However, this aggregate number masks large urban/rural and regional variation within each country, as shown in Table 2 and Appendix 2.

**Table 2. Birth Under-Registration by National Average, Sex, Place of Residence, and Regional Dummy**

(see Appendix 2 for definition of regions)

| Births Not Registered (proportion) | | | | | | |
|---|---|---|---|---|---|---|
| | BOLIVIA | BRAZIL | COLOMBIA | DOM. REP. | NICARAGUA | PERU |
| **TOTAL** | **0.230** | **0.145** | **0.160** | **0.258** | **0.153** | **0.084** |
| **By Sex:** | | | | | | |
| male | 0.227 | 0.170 | 0.174 | 0.273 | 0.161 | 0.081 |
| female | 0.233 | 0.199 | 0.169 | 0.284 | 0.143 | 0.080 |
| **By Place of Residence:** | | | | | | |
| urban | 0.208 | 0.144 | 0.133 | 0.231 | 0.079 | 0.068 |
| rural | 0.259 | 0.298 | 0.252 | 0.335 | 0.235 | 0.091 |
| **By Regional Dummy:** | | | | | | |
| 0 | 0.211 | 0.035 | 0.068 | 0.217 | 0.037 | 0.075 |
| 1 | 0.196 | 0.086 | 0.306 | 0.255 | 0.077 | 0.228 |
| 2 | 0.294 | 0.117 | 0.094 | 0.284 | 0.225 | -- |
| 3 | -- | 0.265 | 0.132 | 0.316 | 0.237 | -- |
| 4 | -- | 0.339 | 0.172 | -- | -- | -- |

### *Urban/Rural and Regional Differences*

Urban/rural differences in under-registration abound in all of the countries considered. In absolute terms, the Dominican Republic has the highest level of under-registration in both urban and rural areas (23.1 percent and 33.5 percent, respectively). While urban/rural differences in Peru are not as large as in other countries, whether considered in relative or absolute terms, the differences by regional dummy are considerable (see Table 2, Appendix 2 and Figure 1). In the case of Peru, Region 0 (Resto Costa) refers to all the departments located along the coast of Peru

excluding Lima, while Region 1 (Selva) mostly refers to the two departments located in the Amazonian rainforest that border Colombia and Brazil.

Striking regional differences are also found in Brazil. In the Northeast region of Brazil (Region 3 in Table 2), which is characterized by lower education, lower income levels and a high concentration of Afro-Brazilians, birth under- registration is 26.5 percent, while in the wealthier South (Region 0 in Table 2), only 3.5 percent of births go unregistered.

Likewise in Colombia, under-registration in the capital of Bogota (Region 0) is 6.8 percent, while in the Atlantic region (Region 1) it reaches an average of 30.6 percent. The Atlantic region of Colombia encompasses several indigenous communities (in Guajira and Magdalena-Sierra Nevada) and includes a large share of the Afro-Colombian population (in Atlantico and Bolivar).

In Nicaragua, the highest levels of under-registration also coincide with those areas with the highest levels of poverty, in the autonomous English-speaking populations of RAAN (39.4 percent) and RAAS (54.9 percent), as shown in Figure 1 and Appendix 2. On the other hand, under-registration in the capital of Managua (Region 0) is only 3.7 percent. The indigenous populations of Nicaragua are spread throughout the country and are not concentrated in any one geographic area.

While under-registration is high in all regions of the Dominican Republic, it is especially so in the western part of the country which borders Haiti. For example, in the Elisa Piña province, which directly borders Haiti, birth under-registration is almost 50 percent. While we cannot distinguish between children of native-born versus foreign-born, we recognize that the large presence and low status of Haitian migrants in the Dominican Republic may be driving this result.

**Figure 1. Maps of Under-Registration for Peru and Nicaragua**
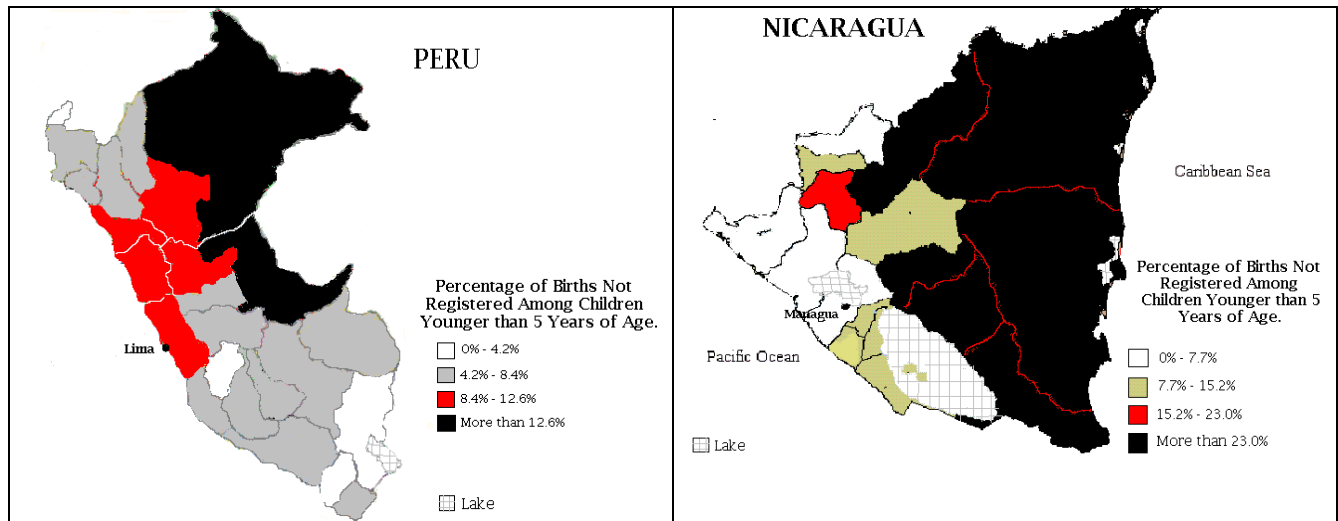


### Mother's Age at Child's Birth

Birth registration also varies by age of mother at the time of the child's birth. Although the frequency of births to very young and old mothers is lower, they are much less likely to register their child's birth. Graph 1 shows the U-shaped relationship between under-registration and mother's age at child's birth.

### Child's Age

As a child ages, s/he is more likely to have her/his birth registered. Graph 2 shows the different levels of under-registration between age 0 and 5 for all the countries. The probability of registration greatly increases at age 1. In Colombia, for example, overall under-registration between age 0-1 is about 49 percent but drops to 23 percent between ages 1-2.

### Barriers to Registration

Barriers to registration can be categorized as economic, legal, administrative, geographic and cultural. Although registration often requires no fee, parents may have to incur indirect costs such as transportation expenses and travel time. Legal quagmires can be frustrating and costly as well, since procedures for late registration (typically for children over one month of age) often require the services of a lawyer. Cultural factors can additionally play important roles, as some groups may not perceive a benefit to including their child in the civil registry. For example, if expectations of holding a future job are poor, and the regard for voting low, parents will be less

likely to incur the costs of registering their child. Moreover, mothers may fear stigmatizing a child by officially declaring that he or she is fatherless (Ordóñez and Bracamonte, 2005).

While there is some availability of information regarding the magnitudes of birth registration, there is far less survey information available regarding the reasons given for not registering. The exception is the DHS survey for Colombia, which inquires about why children were not registered (see Table 3). The results from the Colombian survey reveal concerns about time and costs, with 20 percent of urban mothers listing time concerns as the reason for not registering their child and 17 percent of rural mothers listing the cost. The strong intergenerational component to the registration process observed throughout Latin America is also revealed in the responses by Colombian mothers. (Even when children are born in hospitals in Latin America parental documentation is generally necessary to register the child.) In urban areas 27 percent of mothers reported their children were not registered because they themselves lacked identification documents. In rural areas this accounted for 18 percent of the responses. In some instances the barriers to registration some barriers were surprisingly basic. For instance, approximately 10 percent of mothers in both urban and rural areas reported that their child was not registered because the registry lacked the proper stationery.

**Table 3. Colombia: Reason Why Child Not Registered**

**URBAN**

| Reason child not registered | Freq. | % |
|---|---|---|
| **parent lacks identification** | 114 | **27.42** |
| **lack of time** | 85 | **20.27** |
| **lack of proper stationary at registry** | 48 | **11.52** |
| other | 31 | 7.53 |
| child too young | 24 | 5.68 |
| father absent temporarily | 22 | 5.19 |
| father has not wanted yet | 20 | 4.81 |
| **too costly** | 19 | **4.50** |
| problems at register place | 15 | 3.48 |
| **registry place far away** | 11 | **2.59** |
| wait until father recognizes child | 8 | 1.84 |
| illness/hospitalization of child | 5 | 1.22 |
| father died | 5 | 1.14 |
| father left them | 4 | 0.99 |
| wait until after baptisim | 0 | 0.80 |
| did not want to pay late penalty | 2 | 0.57 |
| do not know where to register | 2 | 0.44 |
| TOTAL | 417 | 100 |

**RURAL**

| Reason child not registered | Freq. | % |
|---|---|---|
| **lack of time** | 69 | **17.86** |
| **too costly** | 66 | **17.14** |
| **parent lacks identification** | 64 | **16.70** |
| **registry place far away** | 52 | **13.44** |
| **lack of proper stationary at registry** | 37 | **9.55** |
| child too young | 20 | 5.25 |
| father has not wanted yet | 15 | 3.93 |
| problems at register place | 14 | 3.57 |
| other | 13 | 3.47 |
| father absent temporarily | 7 | 1.71 |
| wait until father recognizes child | 6 | 1.69 |
| wait until after baptisim | 5 | 1.36 |
| do not know where to register | 5 | 1.36 |
| did not want to pay late penalty | 5 | 1.36 |
| father left them | 4 | 0.93 |
| illness/hospitalization of child | 2 | 0.62 |
| father died | 0 | 0.00 |
| TOTAL | 384 | 100 |

In Colombia and Brazil, birth registration must be done outside of the hospital at a separate official place of civil registry such as a public notary. On the other hand, in the Dominican Republic and Peru, government health centers, hospitals and clinics have public notary offices on the premises. Since 1997 Nicaragua has opened some registration offices in hospitals in Nicaragua (Gobierno de Nicaragua, 2003). However, in all cases, births occurring in very rural areas require an exceptional effort to register due to extreme geographic remoteness, in addition to the other barriers previously mentioned. Many of the countries studied have recently conducted mobile "registration campaigns" as a way to increase birth registration, especially in isolated areas.

Countries have been initiating reforms to reduce costs associated with on-time birth registration. Peru has recently removed monetary fees for on-time birth registration in rural areas. While at the time of the DHS surveys Bolivia was the only country of the six that imposed no monetary fee for birth registration, since 2000 Brazil and Colombia have abolished monetary fees for registration.

*Implications of Lack of Birth Registration*

Survey data containing information on short-term and long-term implications of the lack of birth registration are scarce. Although it is common for household and demographic surveys to inquire as to the reasons why children are not enrolled in or attending school, almost no surveys include as a response that children were turned away from enrolling in school because they lacked a birth certificate. One exception is the 2001 household survey for Brazil, the PNAD, which contains a question that asks why children have not enrolled in school. It does not directly ask about the lack of a birth certificate, but it does include as a response "the lack of documentation," which most likely refers to the birth certificate. Table 4 displays the results for children ages 7-9. We use a young sample because recall error may be an issue if older children were turned away from school. The official age of enrollment in first grade is age 7 according to UNESCO. Of the children not matriculating, 7.7 percent reported that the lack of documentation was the main factor for not enrolling in school.[5] While this is only the sixth-ranked reason provided, the lack of documentation represents a total of 22,571 children given the population weights provided in the survey.

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[5] Typically it is an adult who is the respondent to the questionnaire.

**Table 4. Main Reason for Not Enrolling in School, Children Ages 7-9, 2001 Brazil**

| Main Reason for Not Enrolling | Frequency | Percent |
|---|---|---|
| Sickness or disability | 48,130 | 16.45 |
| Lack of vacancy at school | 43,495 | 14.87 |
| No interest | 28,531 | 9.75 |
| School doesn't exist close to home | 26,926 | 9.21 |
| Lack of money for school related expenses | 25,276 | 8.64 |
| **Lack of documentation** | **22,571** | **7.72** |
| Parents do not want | 19,381 | 6.63 |
| Lack of transportation to school | 6,327 | 2.16 |
| No one to accompany/transport | 3,210 | 1.1 |
| Help with domestic affairs | 1,541 | 0.53 |
| Work or look for work | 819 | 0.28 |
| non-response | 360 | 0.12 |
| Finished desired studies | 0 | 0 |
| Parents prefer child to work | 0 | 0 |
| Other reason | 65,928 | 22.54 |
| Total | 292,495 | 100 |

*Source:* 2001 PNAD, calculations by authors.

The lack of documentation has important implications for the delivery of social programs. Birth certificates for children and national identification documents for adults are often prerequisites in targeting systems such as FICHA CAS in Chile, SISBEN in Colombia, or SELBEN in Ecuador. These information systems are used to minimize type II targeting errors, i.e., errors of inclusion of the non-targeted. For example, the FICHA CAS in Chile collects objective measures of poverty that are used to determine eligibility for an array of social programs. The national identification card is one piece of information that is included in the targeting system to avoid fraud and duplication.

Conditional cash transfer programs (CCTs), a rapidly proliferating type of anti-poverty program in Latin America, stress the co-responsibility of participating families. The CCTs have all addressed problems of under-registration in their program design. Although overall levels of civil registration coverage are high in Chile, the Chile Solidario program has recognized that undocumented Chileans are excluded from programs and has thus undertaken measures to address this problem. As part of its Programa Puente project, Chile Solidario has issued over

26,000 national ID cards to poor families who were undocumented and therefore previously ineligible for the program (Provoste, 2004). Chile Solidario has made the acquisition of national identity documents by all family members a main objective of the program. Identity is a major pillar of the program, along with health, education, family dynamics, housing, work and income.

In Colombia, the Familias en Acción program is a CCT program that also relies on a national information system (SISBEN) to target the program. Targeted beneficiaries must present valid national identification cards before they receive the subsidy. To reduce the potential for exclusion from their program, Familias en Acción promotes civil registration campaigns before entering targeted communities.

Other CCTs have not included civil registration documents as prerequisites for participation. For example, the Red de Protección Social in Nicaragua issues its own internal family registration code rather than restrict coverage only to families with civil registration documents. While this makes compiling information on beneficiaries across programs very difficult, it reduces the potential for type I errors of exclusion (i.e., excluding targeted persons). On the other hand, this type of design may also open the door for program leakage or fraud. A similarly designed program in Honduras decided to require civil registration documents after receiving reports of families exaggerating their household size (Ordóñez and Bracamonte, 2005). In addition, the means through which transfers are delivered often have critical implications for program design, since financial intermediaries typically require official documentation. Colombia's Familias en Acción program, for instance, relies on formal banking institutions to distribute subsidies, an increasingly observed trend in the region.

## 4. Econometric Analysis

In our econometric analysis we are not aiming to model causality, but rather to capture relationships between variables that may help in designing targeted interventions. We consider a simple set of covariates that are available in the five datasets.[6] The variables represent child's characteristics, parents' characteristics, household characteristics and community-level characteristics. The sex of the child is the only characteristic of the child included. Parental characteristics include mother's education and age when birth occurred, presence of

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[6] Immigration from Haiti is an important factor in the high rates of under-registration in the Dominican Republic and should ideally be addressed in the econometric analysis. However, since the DHS does not include a question on migration we omit the Dominican Republic from this part of the analysis.

father/partner and father's education. Two variables describing the pregnancy reflect the mother's means of accessing care as well as the community's supply of health services. We indicate whether each birth was attended by a health specialist and whether the mother received prenatal care. At the household level, the lack of a refrigerator is a proxy for low socio-economic status.[7] Since the summary statistics indicated important differences across geographic areas, regional dummies are included in the second model.

*Model I*

Since our outcome is dichotomous we use a probit model to estimate whether the child is unregistered. Table 5 shows the results in which the more limited set of comparable variables are included. The variable indicating whether the household is located in a rural or urban zone is not included because the definitions differ across the countries. Most importantly, the definition of "urban" in Colombia is linked to the locality containing the administrative seat.[8] The marginal effects are presented in Table 6. This simple set of variables explains approximately 10 percent of the variation in all of the countries except Peru. In Nicaragua the simple specification explains approximately 18 percent of the variation. With the exception of Brazil, the sex of the child is not significantly related to the probability of the child's birth being registered. In the case of Brazil, girls younger than age 5 are 1.3 percentage points more likely to be registered than boys. Brazil is also the exception when the effect of parents' education is considered. In four of the five countries (Bolivia, Colombia, Peru and Nicaragua), mother's education has a larger effect than father's education on the likelihood that a birth is registered. In Brazil, however, the education of the father is more important.[9]

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[7] Although the DHS do not include income variables, parents' education is highly correlated with the permanent income status of the household.

[8] For example, each municipality is divided into both urban and rural zones, regardless of its total population size or density. "Urban" is defined as the zone closest to the town hall, while "rural" encompasses the rest of the municipality. The registry offices are generally located near the municipal seat, and access will be linked to this definition.

[9] It is possible that the results regarding gender are reflecting the older vintage of the data in the case of Brazil, and not a different pattern from the other countries. The authors are seeking updated information for Brazil to examine this hypothesis further.

### Table 5. Model I (probit) Prob. Child's Birth NOT Registered

|  | BOLIVIA | BRAZIL | COLOMBIA | NICARAGUA | PERU |
|---|---|---|---|---|---|
| Sex of child (1= female) | -0.008 | 0.094* | -0.018 | 0.061 | 0.021 |
| Mother's education | -0.038*** | -0.021* | -0.075*** | -0.053*** | -0.018** |
| No refrigerator | 0.252*** | 0.655*** | 0.198** | 0.247* | 0.151* |
| Delivery not attended by health spec. | 0.009 | 0.262 | 0.370** | 0.301** | -0.067 |
| Teenage mother | 0.216*** | 0.103 | 0.229** | 0.085 | 0.562*** |
| No Prenatal | 0.161*** | 0.470*** | 0.629*** | 0.429*** | 0.298*** |
| Male spouse/partner absent | 0.243*** | 0.093 | 0.015 | 0.025 | 0.453*** |
| Father's education | -0.015*** | -0.058*** | -0.014 | -0.018 | -0.014* |
| Child's age | -0.390*** | -0.328*** | -0.279*** | -0.155*** | -0.242*** |
| _constant | -0.096 | -0.745*** | -0.214* | -0.751*** | -1.082*** |
| **R2** | **0.1513** | **0.2202** | **0.1771** | **0.088** | **0.0879** |
| **Obs** | **6716** | **4678** | **3462** | **4584** | **12962** |

\*p<0.10, \*\*p<0.05, \*\*\*p<0.01

### Table 6. Model I Marginal Effects

|  | BOLIVIA | BRAZIL | COLOMBIA | NICARAGUA | PERU |
|---|---|---|---|---|---|
| Sex of child (1= female) | -0.003 | 0.013* | -0.004 | 0.01 | 0.002 |
| Mother's education | -0.011*** | -0.003* | -0.016*** | -0.009*** | -0.002** |
| No refrigerator | 0.065*** | 0.109*** | 0.042*** | 0.038** | 0.017** |
| Delivery not attended by health spec. | 0.001 | 0.044 | 0.092*** | 0.06* | -0.007 |
| Teenage mother | 0.07** | 0.015 | 0.052*** | 0.015 | 0.098** |
| No Prenatal | 0.049* | 0.085*** | 0.170*** | 0.091*** | 0.037*** |
| Male spouse/partner absent | 0.075** | 0.014 | 0.003 | -0.003 | 0.068*** |
| Father's education | -0.004* | -0.008*** | -0.003 | 0.004 | -0.002* |
| Child's age | -0.112*** | -0.046*** | -0.058*** | -0.026*** | -0.028*** |

Lacking a refrigerator significantly predicts that the child's birth will be unregistered in all five of the countries. The largest effect is in Brazil, where the probability of being unregistered increases by 10 percentage points. Along with the results for parental education, this finding indicates that children of lower socioeconomic status have a higher risk of being undocumented.

Some of characteristics of the pregnancy may suggest promising areas for targeting interventions. The age of the mother is an important explanatory factor, with children born to teen mothers significantly more likely to be unregistered in Bolivia, Colombia, and Peru. The probability of the birth being unregistered increases by 7 percentage points in Bolivia, 5 in Colombia and 10 in Peru. Mothers who received no prenatal care are at higher risk of having

unregistered births in all five countries (Bolivia, Brazil, Colombia, Peru and Nicaragua). In addition, births that were not attended by a health specialist are significantly more likely to be unregistered in Colombia and Nicaragua, with the probabilities of non-registration rising by 9 and 6 percentage points, respectively.

*Model II*

The regressions shown in Table 7 include a dummy for rural areas and a set of dummies for regions in each country. In order to make these results more comparable across surveys, we ranked the regional dummies (as provided by DHS) by income per capita. In all cases the richest region is omitted, and regions are listed from poorest to second richest. The addition of the geographic variables increases the explanatory power of the models. Households located in rural areas far from administrative services are expected to be less likely to register their births, as are households located in difficult terrain. The rural dummy is significant in Brazil and Nicaragua, but there is no additional risk for under-registration for rural households in Bolivia, Colombia, or Peru. The regional variables tend to be significantly different than the omitted area in each country.

**Table 7. Model II (probit) Prob. Child's Birth NOT Registered**

|  | BOLIVIA | BRAZIL | COLOMBIA | NICARAGUA | PERU |
|---|---|---|---|---|---|
| Sex of child (1= female) | -0.006 | 0.102* | -0.020 | 0.058 | 0.03 |
| Mother's education | -0.045*** | -0.019 | -0.071*** | -0.044*** | -0.033*** |
| No refrigerator | 0.329*** | 0.382*** | 0.173* | 0.225* | 0.357*** |
| Delivery not attended by health spec. | 0.044 | 0.232 | 0.269* | 0.243* | 0.01 |
| Teenage mother | 0.183** | 0.081 | 0.215** | 0.083 | 0.443* |
| No Prenatal | 0.209*** | 0.327*** | 0.664*** | 0.414*** | 0.288*** |
| Male spouse/partner absent | 0.262*** | 0.174* | 0.073 | 0.048 | 0.433*** |
| Father's education | -0.014** | -0.038*** | -0.025** | -0.008 | -0.018* |
| Child's age | -0.396*** | -0.356*** | -0.299*** | -0.158*** | -0.246*** |
| Rural | -0.055 | 0.277*** | 0.120 | 0.251** | -0.015 |
| Region 1: Lowest Income pc. | -0.406*** | 1.544*** | 0.843*** | 0.104 | 0.115 |
| Region 2 | -0.411*** | 0.776*** | 0.091 | -0.117 | 0.567*** |
| Region 3 | -- | 0.474*** | -0.117 | -0.249* | 0.538*** |
| Region 4 | -- | 1.030*** | 0.021 | -- | -0.198** |
| _constant | 0.19* | -1.469*** | -0.431** | -0.907*** | -1.254*** |
| **R2** | **0.1662** | **0.2970** | **0.2338** | **0.102** | **0.132** |
| **Obs** | **6716** | **4678** | **3462** | **4584** | **12962** |

**\*<sub>p<0.10,</sub> \*\*<sub>p<0.05,</sub> \*\*\*<sub>p<0.01</sub>**

**Table 8. Model II Marginal Effects**

|  | BOLIVIA | BRAZIL | COLOMBIA | NICARAGUA | PERU |
|---|---|---|---|---|---|
| Sex of child (1= female) | -0.002 | 0.011* | -0.004 | 0.01 | 0.003 |
| Mother's education | -0.013*** | -0.002 | -0.014*** | -0.007*** | -0.003*** |
| No refrigerator | 0.086*** | 0.047*** | 0.034** | 0.034* | 0.032*** |
| Delivery not attended by health spec. | 0.012 | 0.031 | 0.059* | 0.046* | 0.001 |
| Teenage mother | 0.054** | 0.009 | 0.045*** | 0.014 | 0.065* |
| No Prenatal | 0.062*** | 0.044*** | 0.171*** | 0.085*** | 0.033*** |
| Male spouse/partner absent | 0.079** | 0.021* | 0.014 | -0.001 | 0.058*** |
| Father's education | -0.004** | -0.004*** | -0.005*** | 0.008 | -0.002** |
| Child's age | -0.111*** | -0.039*** | -0.058*** | -0.026*** | -0.026*** |
| Rural | -0.016 | 0.034*** | 0.024 | 0.043** | -0.002 |
| Region 1: Lowest Income pc. | -0.111*** | 0.398*** | 0.209*** | 0.018 | 0.013 |
| Region 2 | -0.107*** | 0.140*** | 0.018 | -0.018 | 0.08*** |
| Region 3 | -- | 0.069*** | -0.022 | -0.037* | 0.077*** |
| Region 4 | -- | 0.154*** | 0.004 | -- | -0.02*** |

# 5. Conclusion and Future Research

Children from low socioeconomic backgrounds face the greatest risks of being undocumented from birth to age 5. The probability of a birth being registered is also shown to vary by area of residence, as well as certain characteristics of the pregnancy and delivery. Given the recent interest in reducing maternal mortality rates in Latin America, efforts to raise birth registration might be effectively combined with interventions aimed at delivering prenatal care and providing access to health specialists at the time of birth. Teen mothers have higher rates of under-registration and may be an appropriate target group.

A recent report by an international statistical expert group laments the status of the civil registry in Bolivia and asserts that the coverage is insufficient to serve as a basis for monitoring the Millennium Development Goals (Paris 21, 2004). Improving civil registration is recommended as a key action to improve monitoring of progress toward those goals.

Considering that some datasets for the DHS are representative only at the departmental level, applying the technique of poverty mapping (Elber, Lanjouw and Lanjouw, 2003) to the study of birth under-registration is a way to diagnose problems of birth under-registration at the local level. This technique combines survey data, which is rich in socioeconomic variables but lacks geographic detail, with the census, which contains population data at the most disaggregated level. This type of analysis will allow us to estimate geographically disaggregated levels of under-registration, which can help donors and agencies in better targeting their

programs. We plan to apply this technique to Bolivia, Brazil, and Nicaragua in order to better understand the regional variation in birth registration at a much lower level of aggregation.

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## Appendix 1. Variation in Survey QUESTIONS ON BIRTH CERTIFICATE REGISTRATION:

**COLOMBIA:**
The Colombia DHS includes five related questions: one on receipt of the birth certificate, one on birth registration, and three follow-up questions pertaining to the act of registration. Regarding the birth certificate, mothers of children less than 5 years old are first asked: "¿A usted le dieron el certificado de nacimiento de NOMBRE?" (Did you receive a birth certificate for NAME?) The questionnaire then asks about registration: "¿El nacimiento de NOMBRE fue registrado?" (Was the birth of NAME registered?) It follows with the next three conditional questions: "¿Dónde fue registrado?" (Where was the birth registered?), "¿Por qué no ha registrado el nacimiento de NOMBRE?" (Why was the birth of NAME not registered?), and "¿Sabe usted cómo registrar el nacimiento de NOMBRE?" (Do you know how to register the birth of NAME?).

**BOLIVIA:**
The Bolivia DHS asks: "¿Tiene NOMBRE certificado (**acta**) de nacimiento?" (Does NAME have an official birth certificate?) If the mother answers YES, she is then asked to show it to the interviewer.

**DOMINICAN REPUBLIC:**
The DHS in the Dominican Republic asks: "¿Tiene NOMBRE certificado (**acta**) de nacimiento?" (Does NAME have an official birth certificate?) If the mother answers YES, she is then asked to show it to the interviewer.

**PERU:**
The Peru DHS asks: "NOMBRE fue inscrito en la Municipalidad?" (Was NAME registered in the Municipality?).

**NICARAGUA:**
The Nicaragua DHS survey asks: "Fue registrado el nacimiento de (NOMBRE)?" **Si contesta SI**: Puede usted mostrarme el certificado o partida que usted tiene para (NOMBRE): CERTIFICADO MINSA, COLILLA DEL REGISTRO CIVIL, PARTIDA DE NACIMIENTO, NO LO TIENE ELLA, NO LO MUESTRA. **Si contesta NO:** ¿Por que no fue registrado el nacimiento de (NOMBRE)? NO SABE COMO O DONDE HACERLO, NO ES IMPORTANTE/NO LO NECESITA, LO HARA MAS TARDE, ES MUY CARO, NO SABE.

**BRAZIL:**
The DHS Brazil survey asks: "¿Tem certidão de nascimento de (NOME)?" (Do you have the birth certificate of NAME?).

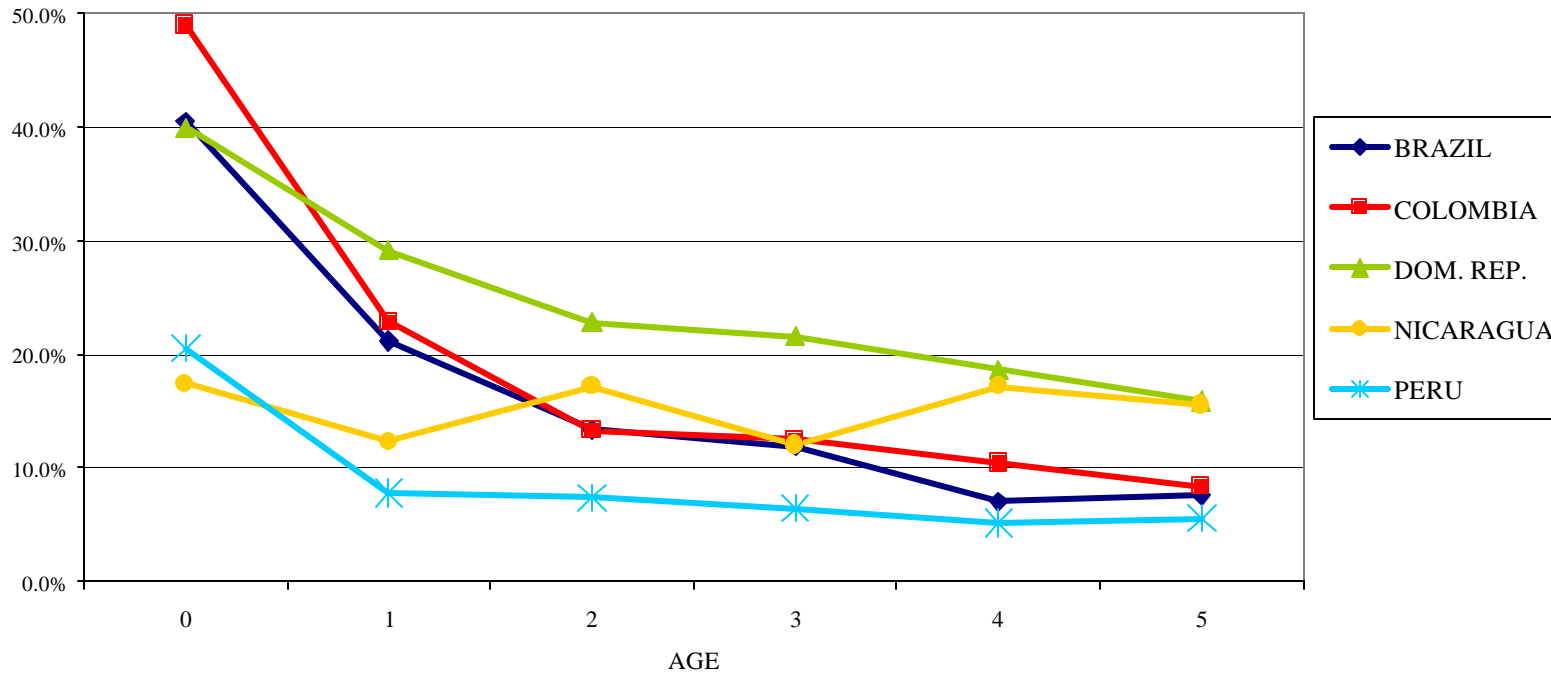**Graph 1. Birth Under-Registration by Age of Mother at Child's Birth**

proportion not registered

MOTHER'S AGE AT CHILD'S BIRTH

Brazil
Colombia
Dom.Rep.
Nicaragua
Peru
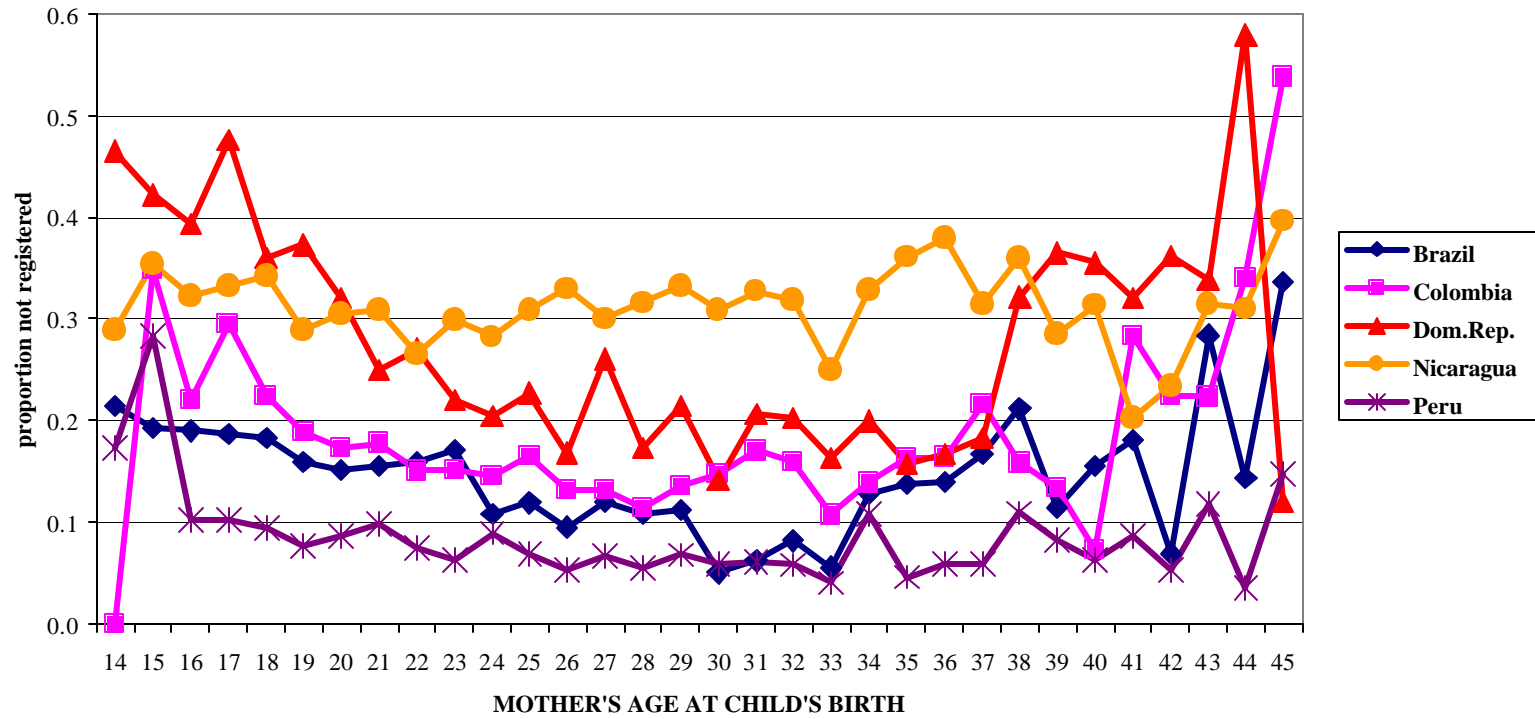
**Graph 2.  Birth Under-Registration by Child's Age**

# Appendix 2.  Birth Under-Registration, Regional Dummies
*Note:* The omitted category in the regressions corresponds to region 0 (richest).

**PERU**

| | | |
|---|---|---|
| Selva alta | 0.104 | Region 1 |
| Selva baja | 0.177 | Region 2 |
| Lima Metropolitana | 0.104 | Region 3 |
| Sierra | 0.065 | Region 4 |
| Resto Costa | 0.056 | Region 0 |

**BRAZIL**

| | | |
|---|---|---|
| Nordeste | 0.278 | Region 1 |
| Norte | 0.340 | Region 2 |
| Centro Leste | 0.083 | Region 3 |
| Centro Oeste | 0.124 | Region 4 |
| Rio de Janeiro | 0.050 | |
| Sao Paulo | 0.011 | Region 0 |
| Sul | 0.044 | |

**BOLIVIA**

| | | |
|---|---|---|
| La Paz, Oruro, Potosi | 0.211 | Altiplano (1) |
| Chuquisaca, Cochabamba, Tarija | 0.196 | Valle (2) |
| Santa Cruz, Beni, Pando | 0.294 | Llano (0) |

note: Valle => Quechua, Llano => Guarani,
Altiplano => Aymara.

**DOMINICAN REPUBLIC**

| | | |
|---|---|---|
| Distrito Nacional | 0.207 | Region 1 |
| Santo Domingo | 0.257 | |
| Azua | 0.400 | |
| Peravia | 0.302 | |
| San Cristobal | 0.305 | |
| Monte Plata | 0.351 | |
| Hato Mayor | 0.301 | South (2) |
| El seybo | 0.489 | |
| La Romana | 0.200 | |
| San Pedro de Macoris | 0.207 | |
| La Altagracia | 0.316 | |
| Barahona | 0.340 | |
| Pedernales | 0.429 | |
| Independencia | 0.326 | |
| Monte Cristi | 0.328 | |
| Bahoruco | 0.488 | |
| | | West (3) |
| Elias Piña | 0.494 | |
| San Juan | 0.419 | |
| Stgo Rodriguez | 0.252 | |
| Dajabon | 0.200 | |
| Valverde | 0.162 | |
| Samana | 0.272 | |
| Sanchez Ramirez | 0.270 | |
| Puerto Plata | 0.289 | |
| San Jose de Ocoa | 0.314 | |
| Duarte | 0.370 | |
| Ma. T. Sanchez | 0.352 | North (0) |
| Espaillat | 0.190 | |
| Santiago | 0.200 | |
| Salcedo | 0.140 | |
| La Vega | 0.180 | |
| Monseñol Nouel | 0.173 | |

**COLOMBIA**

| | | |
|---|---|---|
| Guajira, Cesar, Magdalena | 0.294 | |
| Atlantico, Bolivar Norte | 0.247 | Atlantico (1) |
| Bolivar, Sucre, Cordoba | 0.398 | |
| Santanderes | 0.096 | Oriental (2) |
| Boyaca, C'marca, Meta | 0.093 | |
| Antioquia | 0.157 | |
| Medellin | 0.047 | |
| Caldas, Risaralda, Quindio | 0.106 | Central (3) |
| Tolima, Huila, Caqueta | 0.195 | |
| Cauca, Nariño | 0.110 | |
| Valle del Cauca | 0.120 | |
| | | Pacifica (4) |
| Litoral Pacifico | 0.416 | |
| Cali | 0.164 | |
| Bogota D.C. | 0.068 | Region 0 |

**NICARAGUA**

| | | |
|---|---|---|
| Nueva Segovia | 0.051 | |
| Jinotega | 0.303 | |
| RAAN | 0.394 | Northeast (1) |
| Matagalpa | 0.132 | |
| Masaya | 0.152 | |
| Chontales | 0.287 | |
| Rivas | 0.096 | |
| Carazo | 0.093 | |
| Granada | 0.098 | South (2) |
| Boaco | 0.239 | |
| Rio San Juan | 0.239 | |
| RAAS | 0.549 | |
| Esteli | 0.082 | |
| Chinandega | 0.046 | |
| Leon | 0.072 | Northwest (3) |
| Madriz | 0.158 | |
| Managua | 0.037 | Region (0) |

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# Appendix 3. Socioeconomic Characteristics by Country, Based on Census

| Latest Census Year | **2001** | **2000** | **1993** | **2002** | **2001** | **2002** |
|---|---|---|---|---|---|---|
| | **BOLIVIA** | **BRAZIL** | **COLOMBIA** | **DOM. REP.** | **NICARAGUA** | **PERU** |
| Population | 8,300,000 | 183,002,149 | 33,109,840 | 8,562,541 | 5,205,022 | 26,749,000 |
| % Urban | 62.0% | 81.2% | 71.0% | 63.7% | 57.5% | 72.2% |
| Gini | | 57.8 | 55.9 | 52.4 | 60.4 | 47.8 |
| Employment Rate | | 64.3% | 56.9% | 57.3% | 59.2% | 68.2% |
| Child Labor Rate | | 13.5% | 5.7% | 3.9% | 4.2% | 28.0% |
| School Enrollment | | 89.5% | 81.6% | 85.8% | 74.8% | 90.0% |
| % Female-headed households | | 29.8% | 24.6% | 28.2% | 28.3% | 16.7% |
| Total Fertility Rate | | 2.5 | 2.9 | 2.5 | 3.2 | 3.0 |
| Infant Mortality | | 4.4% | 2.6% | 4.0% | 7.6% | 5.4% |