March 11, 2004

The effects of demographic and social factors on trends in the use of maternal health care:
A comparison of Guatemala and Honduras

Author: Cynthia Stanton
Department of Population and Family Health Sciences
The Johns Hopkins Bloomberg School of Public Health

615 North Wolfe Street, E4035
Baltimore, Maryland   21205
Email: cstanton@jhsph.edu
Telephone: 301 270-2962

Abstract:

This paper uses multivariate logistic models to examine the effects of demographic and social factors on the positive trends in institution-based use of antenatal and delivery care with medically trained professionals in Honduras and Guatemala from the late 1980's through the late 1990's. The differential use of these maternal health services by urban/rural residence, parity, age, women's education, women's employment and socio-economic status is similar across country and time period, and resembles patterns of use reported worldwide. The results show that all of these factors exert strong, unchanging and significant effects on use of antenatal care. However, in neither country do these effects explain all of the positive trend; controlling for all of these measured variables, the positive trend in antenatal care persists. In both countries, all of the factors also show strong, unchanging and significant effects on the use of delivery care. In Guatemala, changes in these factors actually account for the increase in use of delivery care, whereas in Honduras, use of delivery care has increased even controlling for these factors. In summary, the results suggest that: 1) disparities in use of antenatal and delivery care exist and are not lessening over time in either country; 2) that unmeasured factors, possibly household, community or health program characteristics are contributing to the positive trends in use of antenatal care in both countries and in delivery care in Honduras; and 3) that strategies in Guatemala to assure more equitable access to a medically trained attendant at birth are required for true progress.

Introduction

Honduras and Guatemala are among very few developing countries which have conducted two national reproductive age mortality studies (RAMOS) in order to measure change in the maternal mortality ratio (MMRatio), as well as to identify cause and place of maternal death. Honduras, one of the true success stories in recent Safe Motherhood history, has documented an approximate 40 percent decrease in the MMRatio over only a seven year period. In 1990, the MMRatio was 182, falling to 108 in 1997 (Meléndez et al 1999). Guatemala reports a decline in the MMRatio of 30 percent over an 11 year period. The RAMOS studies in Guatemala were conducted in 1989 and 2000 and reported MMRatios of 219 and 153, respectively (Duarte et al. 2003). Both countries show marked differentials in maternal mortality by region and urban/rural residence. Both also report increases in the percent of women with a medically trained attendant at birth (46-54% in Honduras from 1990 and 1997 and 29-40% in Guatemala from 1988 and 1998). Given these results, one of the burning questions in Safe Motherhood is: How did these two countries achieve 30 and 40 percent reductions in maternal mortality over a short period of time and what is the role of maternal health care provision in these reductions?

In Honduras, the explanations for the decrease in maternal death have focused on medical-supply-side issues such as an increased availability of health facilities with maternities, development of maternity waiting homes, effective upgrading of medical provider skills, effective identification of high risk women during antenatal care and prioritization of high maternal mortality regions of the country (Danel and Rivera 2003). The 2000 RAMOS report for Guatemala does not elaborate on explanations for the decline, but outlines recommendations for future programming to decrease maternal mortality which focus heavily on increased provision of essential obstetric care, epidemiologic surveillance of maternal mortality, education regarding the recognition of obstetric complications, and policy support for maternal mortality reduction (Duarte et al. 2003).

The purpose of this paper is to broaden the discussion of the interpretation of the RAMOS study results in these two countries. RAMOS studies are a rich and unique data source on the biological and the avoidable causes of maternal death. These studies provide in-depth information on maternal deaths and the circumstances and care-seeking that preceded that death, information which is not available through other means. However, nationally representative data which document the behaviors of surviving women is also needed to aid in the interpretation of RAMOS results.

The objective of this paper, therefore, is to examine the social and demographic factors associated with use of maternal health care and to identify the effect of these factors on the trends in antenatal and delivery care use. The results of this analysis will either support or undermine the argument that health sector policies led to increased use of maternal health care, which in turn resulted in a decline in maternal mortality. For example, in settings in which use of maternal health care is inequitably distributed across geographic areas or socio-economic groups in a population, an impressive upward trend at the national level in maternal health care use may be explained simply by changes in

urbanization, female education or other indicators associated with high levels of service use. In fact, it is possible that the positive trend is masking increasingly inequitable access to maternal health care. In such cases, maternal mortality may decline, though it is doubtful that dramatic declines could be expected if disadvantaged women consistently lack access to care. However, even if maternal mortality did decline, this scenario suggests that the progress achieved in service use was most likely due to social and economic development of the population and not to health sector policies to increase access to maternal health care. If the positive trend in service use is not accounted for by changes in social and economic characteristics of the population, then the successful implementation of health sector policy to increase access to care may be responsible. Both types of result have been documented thus far in developing countries. In a recent paper by Curtis et al. (2003) in which they examine use of delivery care in six very different developing countries (Bangladesh, Bolivia, Ghana, Indonesia, Malawi and the Philippines), such factors were found to entirely explain the positive trend in Bangladesh and to diminish the trend in Bolivia and Indonesia.

Methods

Data Sources

Data from the Honduras National Surveys of Epidemiology and Family Health in 1991, 1996 and 2001 and from the Guatemalan Demographic Health Surveys in 1987, 1995 and 1998-99 are used for this analysis. All of these surveys are nationally representative, population-based surveys of women of reproductive age. The earliest surveys in Honduras and Guatemala utilized self-weighting samples, whereas the samples for the remaining four surveys are weighted. Data regarding use of antenatal and delivery care were collected for all live births in the last five years in the Guatemalan surveys and in the Honduran 2001 survey. These questions pertained to all still or live born children in the five years prior to interview in the Honduran 1991 survey and to the last still or live born child in the five years prior to interview in the Honduran 1996 survey. For purposes of comparability, this analysis is based on maternal health care associated with the last live born child within five years prior to interview. The number of these births in the samples ranged from approximately 2,700 to 6,000 in the Honduran surveys and from 4,000 to 4,500 in the Guatemalan surveys.

Use of antenatal care is defined as making at least one antenatal care visit with a medically qualified person (doctor or nurse) in a health facility. It was not possible to construct an indicator for three or more antenatal visits, as is commonly done, because this question was not included in all six of the surveys. Use of a medically trained attendant at birth is defined as delivery assistance by a doctor or nurse in a health facility. For antenatal care, the formulation of the questions and the format of the response codes varied little across the six surveys. For delivery care, although the surveys used different approaches to asking and recording answers to questions regarding the provider at delivery and the place of delivery, in all cases it was possible to construct the variable as defined above. Births which occurred at home with the assistance of a doctor or nurse

are not included in the percent of births with a medically trained attendant.[1] For this analysis, both antenatal and delivery care are restricted to institution-based care provided by a medical professional, assuming that the most effective elements of each type of care (Carrolli et al. 2001, Enkins et al. 1995) require infrastructure in settings without a formal program to offer home-based care.

The demographic (or biologic) and social factors examined in this study include: age, parity, residence, woman's education, women's work, and socio-economic status. Wealth quintiles are used as indicators of socio-economic status. These quintiles were constructed via principal components analysis using data on ownership of household assets, as described by Fillmere and Pritchett. (2001). Comparable household data on 13 assets were used for the construction of the wealth quintiles. In addition, data on ethnicity were available only in the Guatemalan surveys.

The selection of demographic and social factors to examine was based on the factors shown to be associated with maternal health care use worldwide (DHS STATCompiler 2004) and the availability of comparable data in all six surveys. Data on perceived obstetric complications, which no doubt influence a woman's decision to seek care, are not available for this analysis. Widely varying sets of questions regarding obstetric problems experienced during pregnancy and at birth were asked in the Guatemalan and Honduran surveys. Their lack of comparability precludes use of these data.

The analysis of these data is carried out in three steps. First, bivariate analysis of the demographic/social factors and use of antenatal and delivery care is presented by time period for each country. Multivariate logistic regression is then used to assess the significance of the trend in the use of antenatal and delivery care in each country by combining all three datasets from that country. Demographic and social variables are then added to these models to determine their effect on trend. Finally, the datasets from all three time periods and both countries are combined, and an additional variable to identify "country" is added to the new dataset. As with the individual country analyses, a multivariate logistic model is used to assess the significance of the trend in antenatal and delivery care use, and then to assess the effect on these trends of the demographic/social factors, as well as any possible independent effect of country residence.

Results:

Descriptive statistics
Tables 1a and 1b present the percent distributions of last live birth in the five years preceding interview (henceforth, births) for which the mother received antenatal and delivery care by demographic and social factors. For simplicity of presentation, the descriptive statistics are restricted to the results of the first and third surveys in each country. The reference points for these surveys are as follows: Honduran Survey 1: 1988; Survey 3: 1998; and Guatemalan Survey 1: 1983; Survey 3: 1996. Both Honduras and Guatemala show sizable increases in the percent of births receiving medically trained antenatal and delivery care over this approximate ten year period. In Honduras, use of antenatal care increased from 72 to 84 percent. In Guatemala, use of antenatal care

increased from 38 to 64 percent.   Delivery care increased in Honduras from 45 to 61 percent. Guatemala experienced a similar increase moving from 33 to 45 percent.   In spite of very impressive increases in antenatal and delivery care use in Guatemala, antenatal care coverage in the late 1990's is still lower than it was in Honduras a decade earlier and delivery care is equal to the Honduran rate from the previous decade.

The patterns of antenatal care use in Guatemala and Honduras by demographic and social indicators are very similar, with the exception that the disparities between the advantaged and disadvantaged groups in Guatemala are more extreme than in Honduras, bearing in mind that overall use rates in Honduras are so high. In both countries, these disparities are clearly still evident in the most recent survey, but did lessen over the 1990's. The factors that are most strongly and positively associated with antenatal care use in both countries are women's education and the relative wealth quintiles. Parity is strongly and negatively associated with antenatal care use. There is a consistent but weak, negative association between woman's age and use of antenatal care.

It should be noted that the fourth and fifth wealth quintiles were combined for the Honduras surveys in 1996 and 2001 due to the fact that more than 20 percent of Honduran women (25%) scored the maximum on the household asset index. This implies that the household assets used to construct the index in Honduras do not adequately distinguish varying levels of wealth among the wealthier population. Given the necessity for using comparable data for Honduras and Guatemala, quintiles 4 and 5 were also combined in the Guatemala data for analyses in Tables 2-3.

The only indicator reflecting noticeably different patterns of antenatal care use between countries is type of place of residence. Residence is categorized into three types: "metropolitan" (ie, the area around Guatemala City in Guatemala and Tegucigalpa and San Pedro Sula in Honduras), "other urban areas", and "rural areas". In Guatemala at the first survey, large differences in coverage are apparent with 77 percent of women in the metropolitan area reporting use of antenatal care, as compared to 29 percent of rural women. By 1999, this disparity has decreased to 84 and 52 percent. In Honduras at the first survey, 79 percent of women residing in the metropolitan area, as compared to 66 percent of rural women, report antenatal care use. By 2001, 90 percent of women reported antenatal care use in metropolitan Honduras and 81 percent of rural women reported use. Clearly, both countries made large strides in increasing access to antenatal care during the 1990's. However, unlike Guatemala, Honduras appears to have achieved access nearly equal in both urban and rural areas of the country.

The disparities in delivery care use in both countries are in the same direction as those seen for antenatal care, only much greater. For example, in the earliest survey, in Guatemala, 84 percent of births to women in the highest wealth quintile received delivery care relative to 9 percent of births to women in the lowest wealth quintile. In Honduras, these figures are 86 and 11 percent, respectively. As with antenatal care, women's education, urban residence and parity are also strongly related to delivery care use, and age shows a consistent but weak, negative association with delivery care use. Again, like

antenatal care use, these disparities clearly remain in the most recent survey, though all have decreased over time.

Unfortunately, ethnicity was only measured in the Guatemalan surveys. Guatemala has slightly more than one third of its population which is indigenous, as opposed to mixed race or of Spanish descent. Virtually all social indicators in Guatemala show serious disadvantage for the indigenous population. Honduras, in contrast has over 90 percent of its population which is mixed race or of Spanish descent, and large scale surveys have not deemed it necessary to measure ethnicity. In Guatemala, 18 percent of indigenous women versus 52 percent of mixed race women received antenatal care 1987, though this disparity decreases by 1999 (46 versus 73 percent). The disparities are even greater for delivery care with 11 percent of indigenous women receiving care in 1987 versus 48 percent of mixed race women. By 1999, the disparity is at 17 versus 60 percent, respectively.

In summary, the differentials shown here for antenatal and delivery care are very similar to those seen in other countries around the world (DHS STATCompiler 2004). The patterns of delivery care use in Honduras and Guatemala are somewhat more similar to each other than those seen for antenatal care use. This is primarily due to the near complete coverage of antenatal care in Honduras.

Analysis of Trend
To assess the significance of the trend in use of antenatal and delivery care, the data sets from all three surveys from each country were combined into separate country files. Multivariate logistic models were used in which the dependent variable is the (log) odds of receiving antenatal or delivery care, and year of birth is entered as the independent variable representing trend. Next, the demographic factors (age, parity) were introduced to the model, followed by the group of social factors (residence, women's education, women's paid work and the relative wealth quintiles). The effect of these demographic and social factors on the trend is judged based on the change in the significance and the magnitude of the coefficient on the year of birth variable. Interaction terms were used to assess differential effects of these factors over time. The results of this analysis for antenatal and delivery care are included in Tables 2a-b, respectively.

The results in Model 1 (Table 2a) show that use of antenatal care has been increasing at between six and seven percent per year in both Honduras and Guatemala between the late 1980's and the late 1990's. The trend in use of antenatal care is highly significant ($p < 0.001$) in both countries.   In both countries, this significant trend persists and is virtually unchaged following the addition of all of the demographic and social factors into Model 2. No interaction terms were identified which would suggest that the effect of these various factors changed significantly over time in either country. The results in Model 2 imply that the increased coverage of antenatal care use in Honduras and Guatemala is not explained by changes in the age structure, urbanization, female education, female employment and relative wealth, although all of these factors are associated with its use.

In Guatemala, all of the demographic and social factors remain significant. The factors exerting the strongest effects on the odds of using antenatal care are women's education, the relative wealth quintiles and rural residence.   Adding ethnicity into Model 2 resulted in a negligible change to the odds for trend and for all other variables except the relative wealth quintiles and "no education", which were somewhat weakened. The independent effect of being of indigenous relative to mixed race on use of antenatal care was 0.590 (p < 0.001) (data not shown).

In Honduras, the variable representing trend in antenatal care use is virtually unchanged by the addition of the demographic and social factors, and remains highly significant (p< 0.001). As would be expected, the effects of these variables are similar, though weaker, in Honduras than in Guatemala. Two additional differences between the countries, however, should be noted: women's paid work is no longer significant and the direction of the effect of rural residence in Honduras changed relative to that shown in the descriptive statistics in Table 1a. This suggests that controlling for the other demographic and social indicators, rural residence actually increases the odds of receiving antenatal care (odds: 1.264, p < 0.001) relative to residence in Tegucigalpa or San Pedro Sula. This result attests to the saturation of antenatal care coverage in Honduras.

Although the effect of being 30 years old or less was positive and not significant when added to the model with only year of birth in both countries, younger age becomes negative and highly significant in the presence of parity, and remains as such with the addition of the social factors. That is, when controlling for parity which is negatively associated with antenatal care use, younger age decreases the odds (30 to 35 percent) of receiving this care.

Table 2b includes the results of Models 1 and 2 for use of delivery care. In Guatemala and Honduras, delivery care use has been increasing at two and five percent per year, respectively. In both countries, the trend is highly significant (p < 0.001).   The effect of introducing the demographic and social factors, however, varies markedly by country. In Honduras, when controlling for demographic and social factors, the trend is increased to nine percent per year, and remains highly significant (p < 0.001). Likewise, all of the demographic and social factors, except residence in "other urban" areas, remain highly significant and mirror the patterns shown in Table 1b. The most striking change in these results for delivery care as compared to the results for antenatal care, is that residing in "other urban" and rural areas becomes strongly and negatively associated with use of delivery care. For example, the odds of receiving delivery care for rural women is only 0.15 (p < 0.001) relative to the reference group of women living in Tegucigalpa/San Pedro Sula. The other difference worth noting is the stronger negative relationship between the demographic and social factors and delivery care, as compared to those effects for antenatal care. No interaction terms were identified to suggest that the effects of any of these factors have changed over time.

In Guatemala, the trend variable for delivery care becomes negative and loses significance in Model 2 as a result of introducing the demographic and social factors, all

of which are highly significant ($p < 0.001$). These results suggest that in Guatemala the improvement seen in delivery care coverage from the late 1980's through the late 1990's is explained by changes in these factors. Controlling for ethnicity in the model only weakened the effects of the demographic and social factors, and is associated with an independent effect of 0.298 ($p < 0.001$) on the odds of delivery care use among indigenous as compared to mixed race women. Similar to the Honduran case, all of the demographic and social factors show substantially stronger negative effects on delivery care than on antenatal care.

Given that survey respondents are selected for interview from geographic clusters (neighborhoods or villages), it is possible that their behaviors vary by characteristic of their cluster, as well as by their own personal characteristics. Since, comparable community level data on the distance to the nearest health facility or other health care access indicators were not available; a statistical method which controls for cluster-level variation was used. Population-averaged logit models were used to estimate the effect on the trend of the demographic and social factors for antenatal and delivery care in Guatemala and Honduras[2], taking into account the geographic cluster of the respondents. The results from these models were very similar to those presented in Tables 2a and b, and suggest that the individual level effects described above are not simply a reflection of cluster-level variation. (data not shown).

As a means of identifying unmeasured, country-specific factors associated with positive trends in antenatal and delivery care use, all six datasets were combined, an additional variable representing "country" was added to those in Models 1 and 2 and plausible interaction terms were tested. In an attempt to control for the effects of ethnicity on these results, additional models for antenatal and delivery care were run in which all indigenous women were excluded from the analysis. These results are presented for antenatal and delivery care in Models 3 to 6 in Tables 3a and 3b, respectively.

As expected, the trend in antenatal care is significant in this combined data set. It remains significant and only somewhat reduced from 1.101 to 1.095 by the introduction of the demographic and social factors (see Model 4). In this model, "other urban" and rural residence exert a negative effect on antenatal care use, as was seen in Guatemala, but not the Honduran analysis (Table 2a). In Model 5, country effects are assessed and interaction terms for country and type of place of residence are added to account for the opposite relationships shown for these variables in Guatemala and Honduras. The trend variable remains positive, somewhat reduced (from 1.095 to 1.069) and highly significant ($p < 0.001$). The interaction terms are significant and positive, as expected, suggesting significantly increased odds of using antenatal care among those residing in the rural and "other urban" areas of Honduras compared to their Guatemalan counterparts. No significant differences in antenatal care use were detected between metropolitan residents in Guatemala versus Honduras. This remains the case when births to indigenous Guatemalan women are excluded from the analysis in Model 6. However, the strong and significant effects of the demographic and social factors do not explain the positive trend in these two countries.

Regarding delivery care, the trend is significant and remains significant and somewhat increased following the introduction of the demographic and social variables, as well as the country effect (Models 3-5). The introduction of a variable to identify country effects in Model 5 is highly significant (p< 0.001) but exerts little change on the effects associated with the other factors in the model. The magnitude of the Guatemalan country effect (0.561) is not surprising given the difference in results shown in Table 1b. The results excluding births to indigenous women from the analysis are presented in Model 6. The only noticeable change to this final model is that the country effect for residence in Guatemala relative to Honduras has been reduced from 0.561 to 0.839; that is, holding constant the demographic and social factors and excluding the disadvantaged indigenous population in Guatemala, residing in Guatemala decreases the odds of delivery care use by 16 percent relative to residing in Honduras.

Discussion

This paper analyzes the effects of demographic and social factors on the trends in use of antenatal and delivery care provided by medically trained attendants in a health care facility in Honduras and Guatemala from the mid to late 1980's through the late 1990's. In both countries and for both types of maternal health care, significant increases were recorded based on data from large-scale, nationally representative surveys of women of reproductive age. In both countries, the positive trend in antenatal care use was not explained by the demographic and social variables examined here, despite the strong and significant effects shown by all of these factors. The most notable difference between the two countries is that rural residence in Honduras increases the likelihood of receiving antenatal care, whereas rural Guatemalan women are at substantial disadvantage relative to their capital city counterparts.

The effect of the demographic and social factors on trends in delivery care varied by country. The trend was not explained by these factors in Honduras, again despite strong and significant effects associated with all of these factors. The positive trend in delivery care was explained by these factors in Guatemala. That is, holding age structure, fertility, urbanization, female education, female employment and relative wealth constant in Guatemala, there was no increase in the use of delivery care over this 11 year period. When all six data sets were combined, living in Guatemala is associated with a 40 percent decrease in the odds of using delivery care relative to residence in Honduras, holding other factors constant.

It is noteworthy that the magnitude (and significance) of virtually all of the factors in the model are strikingly similar across country and time for each type of maternal health care. In general, the results showed stronger negative effects for the demographic and social factors for use of delivery care than for use of antenatal care. This suggests that both Honduras and Guatemala still struggle with providing access to the more complicated set of requirements for delivery care relative to antenatal care.

It is also interesting to note that high parity women are between 40 to 65 percent less likely to receive antenatal or delivery care relative to first births, and that this effect has not significantly diminished over time. This effect continues despite heavy promotion in both countries of antenatal risk screening which identifies high parity women as 'high risk" and encourages them to deliver in hospitals. Clearly, Honduran and Guatemalan women are not complying with this advice.

There are a number of limitations to this analysis. The most serious concern is the fact that the sample of births is restricted to the respondent's last live birth, a practice which may bias results toward wealthier, low parity women. The data collection was sponsored by three different organizations over a 14year period of time. Thus, data quality may vary by survey. The relative wealth quintiles which exert strong effects in all of the analyses shown here, better differentiate the top forty percent of the population in Guatemala than in Honduras. Most importantly, there are no comparable data available on distance to antenatal or delivery care, nor on perceived obstetric complications, both of which undoubtedly influence a woman's care-seeking behavior.

The question posed in this paper was: do demographic and social factors associated with antenatal and delivery care use account for the positive trend in use of these services? The fact that the demographic and social factors do not explain the positive increases in use of antenatal care in either country or in delivery care in Honduras, implies that other unmeasured factors are at play. These may be unmeasured characteristics of the women, their community or of successful, medical supply-side efforts to increase provision of care. Comparable and valid data on obstetric complications are not available, but may well be a missing piece of the answer. Preliminary analyses accounting for the geographic cluster of the respondent produced very similar results to those described above, suggesting that the effects associated with women's individual-level characteristics were not proxies for community-level characteristics. Despite the lack of community level data regarding access to health care, the results of this analysis lend support to the argument that policies to increase access to maternal health care were successful and at least partially responsible for the positive trends in antenatal care use in both countries and in delivery care use in Honduras. As regards use of delivery care, this argument is further supported by the fact that during the 1990's, Honduras substantially reinforced its maternity care infrastructure by building additional health facilities and upgrading existing facilities in disadvantaged areas and addressing provider skill (Danel 1998), whereas Guatemala's efforts during the same period appear less focused (Shiffman and Garces 2004).

The argument that increased access to and use of delivery care in Honduras *may be* causally linked to a reduction in maternal mortality is supported, though not proven by these results. The fact that these factors do explain the positive trend in delivery care in Guatemala calls into question the role of increased delivery care as an explanation for maternal mortality decline there. This finding also invites policy-makers and program managers in Guatemala to revisit existing strategies to reach their under-served populations.

REFERENCES

Carroli, J, Rooney, C, Villar, J. 2001. "How effective is antenatal care at preventing serious maternal mortality and morbidity? An overview of the evidence", Journal of Pediatric and Perinatal Epidemiology, Vol. 15 Supplement 1, p 1-42.

Curtis, S, Bell, J, Alayon, S. 2003. "Skilled Attendance at Delivery: A Comparative Study of Trends in Delivery Care in Six Developing Countries", paper presented at the meetings of the Population Association of America, May 1-3rd, Minneapolis, Minnesota

Danel, I and Rivera, A. 2003. "Honduras 1990-1997", chapter in Reducing Maternal Mortality, Learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica and Zimbabwe, editor, M. Koblinsky, Health, Nutrition and Population Series, The World Bank, Washington DC

Danel, I. 1998. "Maternal Mortality Reduction, Honduras, 19901997: A case study". Washington DC, The World Bank.

DHS STATCompiler. 2004. www.measuredhs.com , ORC Macro, Calverton, Maryland.

Duarte, MR, Aviles, JM, Cardenas, JO, Cordon, MC, Bojorquez, Duarte, E, Colindres, JG. 2003. Informe Final : Linea Basal de Mortalidad Materna para el Ano 2000, Ministerio de Salud Publica Y Asistencia Social, Guatemala City, Guatemala

Enkin, M, Keirse, MJ, Renfrew, M and Neilson, J. 1995. A guide to effective care in pregnancy and childbirth, 2nd edition, Oxford University Press, Oxford.

Filmere, D. and Pritchett, LH. 2001. "Estimating wealth effects without expenditure data – or tears: an application to educational enrollments in states of India", Demography, Vol. 38(1), pp. 115-132.

Melèndez, JH, Ochoa Vasquez, J, Villanueva, Y. 1999. Investigacion sobre mortalidad maternal y de mujeres en edad reproductiva en Honduras ; Informe Final Correspondiente al ano 1997, Tegucigalpa, Honduras.

Shiffman, J., Garces, A. 2004. " Institutional Analysis of Safe Motherhood in Guatemala" paper prepared for the annual meetings of the Population Association of America, April 1-3rd, Boston.

Table 1a: Percent distribution of last live births 5 years prior to survey by use of antenatal care and by demographic and social factors; Guatemala surveys 1987,1999 and Honduras 1991,2001

	Antenatal Care							
	Guatemala '87		Guatemala '99		Honduras '91		Honduras '01	
	%	N	%	N	%	N	%	N
Total	37.9	2782	64.1	2848	71.7	3992	83.8	5647
Age Group								
15-19	35.2	233	62.1	230	67.8	379	85.0	653
20-24	38.5	657	65.0	752	74.2	997	84.9	1501
25-29	41.6	765	67.1	740	74.6	980	86.6	1418
30-34	40.1	538	65.3	483	71.9	775	87.0	961
35-39	32.6	399	65.8	390	69.5	482	79.9	651
40-44	29.5	190	44.6	181	67.3	281	72.9	358
45-49	na		63.1	72	54.1	98	57.1	105
Parity								
1	49.6	468	77.3	590	79.5	864	91.1	1437
2-4	41.4	1293	67.9	1357	75.1	1794	85.1	2809
5+	28.1	1021	49.7	901	62.1	1334	73.7	1401
Residence								
Metro Guat City	77.0	313	84.5	694	78.7	765	90.0	1120
Other urban	50.4	500	78.8	451	79.6	883	85.2	1315
Rural	28.6	1969	52.3	1703	66.4	2344	81.1	3212
Woman's Ed								
No education	19.8	1337	45.4	883	52.8	723	64.3	690
Primary	48.2	1220	64.7	1467	71.2	2513	83.9	3681
Secondary +	89.7	225	95.8	498	91.4	756	94.1	1276
Women's work								
Currently working	51.5	404	73.3	756	77.4	1211	86.2	1791
Not working	35.6	2378	60.8	2092	69.2	2781	82.7	3856
Wealth								
< 20%	17.0	693	37.2	450	57.7	1052	78.4	1367
20-39%	23.2	581	43.3	518	68.2	724	79.9	1277
40-59%	33.6	574	58.6	616	72.4	790	83.9	1212
60-79%	51.9	547	77.7	562	79.1	752	90.7	1791
80-100%	83.0	387	90.6	702	88.1	674	-	-
Ethnic Group								
Indigenous	18.2	1147	46.4	983				
Ladina	51.7	1635	73.4	1865	na	na	na	na

Table 1b: Percent distribution of last live births 5 years prior to survey by use of delivery care and by demographic and social factors; Guatemala surveys 1987,1999 and Honduras 1991,2001

	Delivery Care							
	Guatemala '87		Guatemala '99		Honduras '91		Honduras '01	
	%	N	%	N	%	N	%	N
Total	32.8	2782	45.7	2848	44.9	3992	61.1	5647
Age Group								
15-19	33.0	233	47.0	230	44.3	379	66.8	653
20-24	34.1	657	48.4	752	47.2	997	64.6	1501
25-29	35.2	765	47.2	740	49.1	980	62.2	1418
30-34	34.0	538	48.2	483	45.3	775	65.1	961
35-39	25.6	399	44.0	390	38.4	482	54.1	651
40-44	23.7	190	24.8	181	34.5	281	46.9	358
45-49	-	-	43.5	72	41.8	98	40.9	105
Parity								
1	48.9	468	63.4	590	61.3	864	80.0	1437
2-4	36.7	1293	51.3	1357	49.3	1794	63.2	2809
5+	20.5	1021	25.7	901	28.5	1334	39.4	1401
Residence								
Metro Guat City	88.2	313	75.9	694	86.7	765	93.6	1120
Other urban	47.8	500	61.7	451	66.0	883	79.9	1315
Rural	20.2	1969	29.2	1703	23.4	2344	42.9	3212
Woman's Ed								
No education	14.4	1337	22.7	883	16.5	723	27.8	690
Primary	42.8	1220	46.0	1467	40.6	2513	56.6	3681
Secondary +	88.4	225	86.7	498	86.8	756	94.1	1276
Women's work								
Currently working	52.2	404	62.3	756	60.7	1211	73.8	1791
Not working	29.5	2378	39.8	2092	38.1	2781	55.9	3856
Wealth								
< 20%	9.4	693	10.2	450	11.4	1052	27.0	1367
20-39%	14.5	581	20.0	518	27.2	724	49.3	1277
40-59%	26.0	574	32.3	616	43.4	790	71.9	1212
60-79%	53.2	547	63.1	562	73.4	752	89.7	1791
80-100%	83.7	387	85.4	702	86.4	674		-
Ethnic Group								
Indigenous	10.8	1147	17.4	983				
Ladina	48.3	1635	60.5	1865		na		na

Table 2a Unadjusted and adjusted odds ratios for use of antenatal care in Guatemala and Honduras

		Antenatal Care Guatemala ▲		Antenatal Care Honduras ▲	
		Unadjusted odds	Adjusted odds	Unadjusted odds	Adjusted odds
		Model 1	Model 2	Model 1	Model 2
Year of birth	Year of birth	1.074***	1.069***	1.065***	1.066***
Age	Age > 30		1.000		1.000
	Age < 30		0.643***		0.729***
Parity	Parity: 1st		1.000		1.000
	Parity: 2-4 births		0.826**		0.743***
	Parity: 5+ births		0.572***		0.461***
Residence	Metropolitan		1.000		1.000
	Other urban		0.509***		1.143
	Rural		0.427***		1.264**
Women's education:	Some secondary +		1.000		1.000
	Some primary		0.210***		0.366***
	No education		0.108***		177***
Paid work	Currently working		1.000		1.000
	Not working		0.861**		0.923
Relative wealth	4-5th quintiles		1.000		1.000
	1st quintile		0.346***		0.555***
	2nd quintile		0.367***		0.689***
	3rd quintile		0.493***		0.734***

▲ n = 11,877 weighted births   ◄ n = 12, 583 weighted births
*** p < 0.001;   ** p < 0.05

Table 2b Unadjusted and adjusted odds ratios for use of delivery care in Guatemala and Honduras

		Delivery Care Guatemala ▲		Delivery Care ◄ Honduras	
		Unadjusted odds	Adjusted odds	Unadjusted odds	Adjusted odds
		Model 1	Model 2	Model 1	Model 2
Year of birth	Year of birth	1.021***	0.995	1.053***	1.094***
Age	Age > 30+		1.000		1.000
	Age < 30		0.628***		0.708***
Parity	Parity: 1st		1.000		1.000
	Parity: 2-4 births		0.642***		0.554***
	Parity: 5+ births		0.375***		0.350***
Residence	Metropolitan		1.000		1.000
	Other urban		0.325***		0.346
	Rural		0.239***		0.150***
Women's education	Some secondary +		1.000		1.000
	Some primary		0.265 ***		0.318***
	none		0.135***		0.175***
Paid work	Currently working		1.000		1.000
	Not working		0.767***		0.812***
Relative wealth	4-5th quintiles		1.000		1.000
	1st quintile		0.140***		0.182**
	2nd quintile		0.208***		0.339***
	3rd quintile		0.370***		0.549***

▲ n = 11,877 weighted births   ◄ n = 12, 583 weighted births
*** $p < 0.001$;   ** $p < 0.05$

Table 3a Unadjusted and adjusted odds ratios for use of antenatal care; Combined Guatemala and Honduras data files

		Antenatal Care: Combined Guatemala and Honduras ▲			
		Unadjusted odds	Adjusted odds	Adjusted odds	Adjusted odds
		Model 3	Model 4 Full model	Model 5 Full model with country effects	Model 6# Full model with country effects (Indigenous women excluded)
Year of birth	Year of birth	1.101***	1.095***	1.069***	1.063***
Age	Age > 30+		1.000	1.000	1.000
	Age < 30		0.654***	1.684***	0.683***
Parity	Parity: 1st		1.000	1.000	1.000
	Parity: 2-4 births		0.784***	0.789***	0.748***
	Parity: 5+ births		0.520***	0.519***	0.469***
Residence	Metropolitan		1.000	1.000	1.000
	Other urban		0.824**	0.515***	0.625***
	Rural		0.681***	0.391***	0.531***
Women's education	Some secondary +		1.000	1.000	1.000
	Some primary		0.284***	0.295***	0.310***
	none		0.104***	0.146***	0.163***
Paid work	Currently working		1.000	1.000	1.000
	Not working		0.853***	0.894**	0.943
Relative Wealth	4th-5th quintiles		1.000	1.000	1.000
	1st quintile		0.622***	0.404***	0.417***
	2nd quintile		0.621***	0.467***	0.496***
	3rd quintile		0.660***	0.565***	0.555***
Country	Honduras			1.000	1.000
	Guatemala			1.029	0.958
Interaction Terms	Honduras* Other urban			2.362***	1.929***
	Honduras * Rural			3.959***	2.790***

▲ n = 24,460 weighted births   # births to 5318 indigenous women removed from sample
*** p < 0.001;   ** p < 0.05;

Table 3b Unadjusted and adjusted odds ratios for use of delivery care; Combined Guatemala and Honduras data files

		Delivery Care: Combined Guatemala and Honduras ◄			
		Unadjusted odds	Adjusted odds	Adjusted odds	Adjusted odds
		Model 3	Model 4 Full model	Model 5 Full model with country effects	Model 6# Full model with country effects (Indigenous women excluded)
Year of birth	Year of birth	1.052	1.062***	1.048***	1.058***
Age	Age > 30+		1.000	1.000	1.000
	Age < 30		0.656***	0.673***	698***
Parity	Parity: 1st		1.000	1.000	1.000
	Parity: 2-4 births		0.592***	0.595***	0.601***
	Parity: 5+ births		0.349***	0.355***	0.355***
Residence	Metropol.		1.000	1.000	1.000
	Other urban		0.400***	0.371***	0.442***
	Rural		0.201***	0.201***	0.224***
Women's education	Some secondary +		1.000	1.000	1.000
	Some primary		0.289***	0.301***	0.322***
	None		0.128***	0.158***	0.199***
Paid work	Currently working		1.000	1.000	1.000
	Not working		0.772***	0.803***	0.792***
Relative wealth	4th-5th quintiles		1.000	1.000	1.000
	1st quintile		0.191***	0.155***	0.159***
	2nd quintile		0.316***	0.270***	0.284***
	3rd quintile		0.496***	0.444***	0.472***
Country	Honduras			1.000	1.000
	Guatemala			0.561***	0.839**

◄ n = 24,460 weighted births
*** p < 0.001;   ** p < 0.05
# 5318 births to indigenous women excluded from sample

18

---

[1] In the five surveys where questions on both place of delivery and provider were asked, one percent or less of the births were reported as having had assistance at birth by a medically trained attendant at home.
[2] Only data from the 1991 and 1996 Honduran surveys could be used in these analyses due to the fact that sample weights vary within cluster in the 2001 Honduran survey.