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Summary

In the last 15 years, maternal mortality rates have been significantly reduced in Peru. In 1996, this rate was as high as 31.6 per 100,000 women while in 2009 it was reduced to 8.5 per 100,000 women. These improvements, although significant, were neither enough —Peru is still well behind developed countries rates— nor solved inequality problems across different groups and areas, especially for poor women living in the Selva region and in rural areas. Strategies to reduce economic, accessibility and cultural barriers are necessary to increase institutional deliveries' rate, and thus reduce maternal mortality. Although information on maternal mortality is scarce, we rely on the strong correlation between this variable and institutional delivery in Peru to analyze the factors contributing to maternal mortality. Internationally, institutional delivery has been found as good predictor of maternal mortality by several authors.

Institutional delivery has increased significantly in the last decade —from less than 50 per cent in 2000 to 80 per cent in 2009—, but great inequalities still marginalize different groups in the country. Women living in rural areas, the Selva region, poor and uneducated women have lower institutional delivery rates than the rest of the population. Even though the government has recently implemented a strategic program to address maternal and neonatal health, with the main objective of reducing maternal mortality, evaluations suggest improvements could be made. Thus, important policy recommendations, coming from the analysis on the barriers to access institutional deliveries, are presented:

- A conditional cash transfer system to promote institutional deliveries could be implemented. Our estimates prove income level is an important variable determining institutional delivery and international experiences suggest conditional cash transfer are a good alternative to reduce economic barriers to access institutional delivery.
- Cultural adequacy of the delivery —stand up delivery, capability of burying the placenta, admitting presence of relatives during delivery, among others— could be widened to increase willingness of different cultural and ethnic groups to attend health facilities for delivery.
- Presence of low level health establishments does not increase the statistical probability of institutional deliveries, although these are the most common health establishments available in poor, rural areas. Investment to increase their resolute level is crucial.

Key words: Maternal mortality, Institutional delivery.
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Introduction

According to the Millennium Development Goals 2008 Report[1] over 500,000 women died during their pregnancy, delivery or within six weeks after the delivery and 99 per cent of these deaths occurred in the developing world. Experts[2] state that most maternal deaths take place at home[3], and state the importance of skilled health assistance to reduce the maternal mortality rate.

In fact, proper care during delivery has a relevant impact in overall maternal and neonatal health. Broadening coverage of institutional deliveries (ID) is one of the targets for the fifth Millennium Development Goal for Improving Maternal Health. Complications during delivery are an important cause of maternal mortality. Indeed, more than 70 per cent of maternal deaths in Peru happened during delivery in 2009. According to the Health Ministry[4], in 2003, hemorrhage was the first cause of maternal death (43 per cent) followed by hypertensive diseases of pregnancy (14 per cent), sepsis (eight per cent) and unsafe abortion (eight per cent); all these complications have a higher probability of being solved if the delivery takes place in an adequate place with skilled health staff. Studies from other countries display consistent results. Renowned academics[5] find that between 16 per cent and 33 per cent of all maternal deaths in developing countries could be avoided by preventing some main complications by skilled attendance at delivery.

Maternal mortality rate (MMR) and proportions of professionally attending deliveries are widely accepted indicators for maternal health. In Peru, the maternal mortality rate in year 2000 was 1.83 per 100,000 live births and the proportion of deliveries that received assistance from specialized sanitary staff was 59.3 per cent[6]. Both indicators are worse than those from developed countries and even from Latin America and the Caribbean average. In developed countries, in year 2006, the MMR was 0.09 per 100,000 live births and the proportion of deliveries attended by skilled health care personnel was 99 per cent. According to the same source, MMR for Latin America and the Caribbean, on average, is 13 per 10,000 live births, and 86 per cent of deliveries are attended by skilled health care personnel.

Thus, the Peruvian Government decided to prioritize institutional delivery as a way to reduce MMR. It took specific actions to improve institutional births ratios attended by health professionals. For instance, the government created the Strategic Program of Maternal and Neonatal Health (PSMN) with a budget of US$138 million in 2008 and US$170 million in 2009.

Government efforts have accomplished an important improvement in MMR. Latest estimations show a rate of 0.85 per 100,000 live births — less than half the 2000 rate. However, an effort still is needed to keep reducing the MMR. Moreover, it is essential to decrease the MMR gap for marginalized groups, especially for rural populations and the poor.

This policy paper presents a brief overview of government interventions on maternal health in Peru. Thereafter it describes the relationship between maternal mortality rates and institutional deliveries, and depicts the current situation on institutional delivery in Peru by women and household characteristics. Finally, it presents statistical the model on the probability of having an ID and draws conclusions and policy recommendations.

Government programs on maternal health

Maternal and infant health has been a priority for Peruvian government in the last decades. One of the first significant maternal and infant care policies was implemented in the 1990s and introduced a health insurance, the maternal and infant insurance (*Seguro Materno Infantil)*, that focused on poor and extremely poor women and children.

Two decades on, the state of insurance in health has changed remarkably. First, the population coverage of social security in health (EsSalud) is stagnating. Second, the public subsidized insurance, *Seguro Integral de Salud* (SIS) accounted for 31 per cent of the insured population and 63 per cent of the poorest population in 2008. The SIS started in the early 1990s as the maternal and infant insurance with partial coverage and evolved to a more complete insurance that covers all poor people in recent years. Affiliations to SIS have doubled in the 2005-2008 period, reflecting the success of the insurance program —at least in terms of population insured.

Moreover, a universal insurance bill went through the Peruvian legislative process, having been approved by Congress in March of 2009. According to this framework law, the goal of the universal insurance will be to cover all Peruvian residents for basic health services (including prevention, promotion, recovery and rehabilitation); these services are determined in the Essential Health Insurance Plan (PEAS). The PEAS was established based on the disease burden, and accounts for 185 benefits, that include obstetric, gynecologic, pediatric, oncologic, contagious and non-contagious conditions. The law was published in April of 2009 to be progressively applied, starting in the country's poorer regions.

Continuing with the maternal health positive trend, the Peruvian government decided to prioritize institutional delivery when it considered reducing maternal mortality as the first National Sanitary Objective in its National Coordinated Health Plan (2007-2020), with the specific goals of reducing teenage pregnancy; complications during pregnancy, delivery and post delivery; and broadening access to different birth control methods[7].

Likewise, in 2008, one of the five budgetary programs created in the Performance Based Budget framework, was the Strategic Program of Maternal and Neonatal Health (PSMN). PSMN seeks to improve women and children's health[8] and reduce maternal and neonatal mortality rates. This strategic program budget represents roughly 0.5 per cent of the Peruvian government's budget and 4 per cent of the Ministry of Health's budget.. This budget was distributed among the Ministry of

Health (34 per cent), the SIS (23 per cent) and the regional authorities (43 per cent) to perform specific activities —broadening the attention of deliveries in institutional establishments, improvements in hemotherapy, increase childbearing women affiliated to SIS and the elaboration of technical guides in maternal and neonatal attention[9].

Government efforts proved successful in reducing the MMR. In fact, ENDES 2009 suggests a MMR of 0.85 per 100,000 live births, which represents a significant reduction from the 18.3 MMR in year 2000. However, this policy paper will make the case for continued efforts to keep reducing the MMR and to close the gap between marginalized groups.

Maternal Mortality Rates and Institutional Deliveries

National average MMR information reveals an important decrease in the last two decades, from 3.16 per 100,000 live births in 1996 to 8.5 in 2009. More disaggregated information on MMR by age groups shows that there is a substantial improvement across all groups. The progress in the 40-44 and 15-19 age groups is especially impressive, with reductions greater than 45 and 20 percentage points, respectively. However, the reliability of the disaggregated information is doubtful[10].

Because of the problems with the disaggregated MMR data, and given our interest in analyzing maternal health by socioeconomic and marginalized groups, it is necessary to focus on ID ratios as institutional delivery is an important factor in preventing maternal mortality. There is a strong negative correlation between MMR and ID ratios. Figure 1 presents the comparison of MINSA´s estimations on MMR by political regions with ID ratios. Results show a very strong negative relationship with a correlation coefficient of -0.82. Thus, this policy paper analyzes and discusses ID ratios as a proxy to MMR and maternal health.

Figure 1
Maternal Mortality Rate and Institutional Delivery Ratios by Political Regions
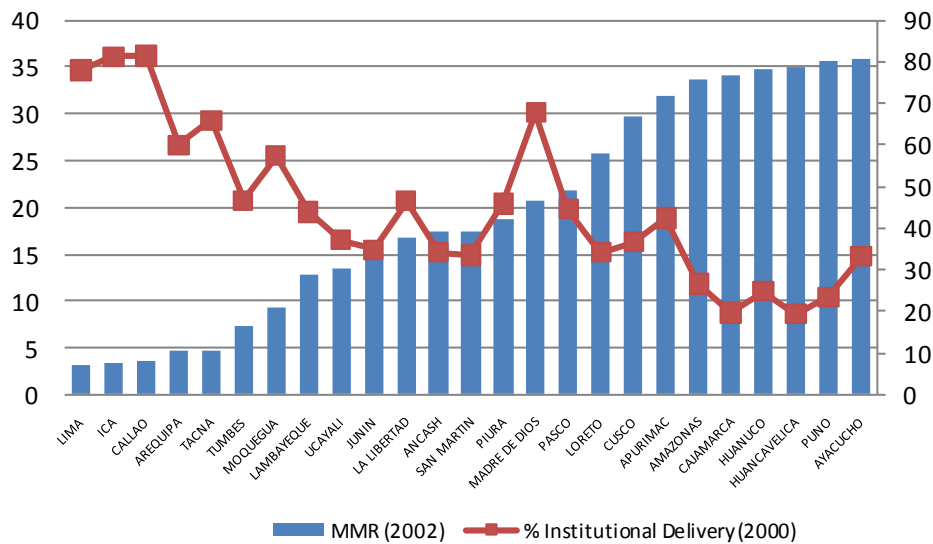
As seen in Figure 1, richer regions, usually located on the coast, present lower MMR (less than five per cent) as well as higher levels of ID. Low income regions, located in the Sierra and Selva areas, show significantly higher MMR with below average ID rates. It is important to note that these poorer regions are mainly indigenous —Quechua and Aymara notably.

## General characteristics of delivery in Peru

Area of residence gap

Even though institutional deliveries have increased significantly in the last decade, great inequalities still marginalize different groups in the country. Data shows that ID ratios have increased from nearly 50 to almost 80 per cent between 2000 and 2009. Nevertheless, nearly one out of two women in rural areas does not access an ID, as compared to only 7.6 per cent in urban areas.

Accordingly, ID ratios differences between regions in Peru are also significant. We consider four regions: the three standard natural regions —Costa, Sierra y Selva— and the Lima Metropolitan Area. The Costa, comprises the west margin of the country and is home to roughly 23 per cent of the population. Metropolitan Lima, even though in the Costa, is analyzed separately because it holds roughly 28 per cent of the population. The Sierra region is composed by the cities and villages of the Andes and holds 35 per cent of the Peruvian citizens. Finally, the Selva region is located in the Amazon rainforest. It is the biggest of the four regions in terms of territory, but holds only 14 per cent of the population.

Figure 2 shows that while the Lima Metropolitan Area and other coastal regions have ID ratio of 997 and 95 per cent, respectively, the Selva and Sierra region indicators stand at 64 and 73 per cent. Compared with 2000, all regions have shown improvements in the last decade. While the Sierra region has been the most successful one, increasing its ratio from 30 per cent in year 2000 to 73 per cent in 2009, the Selva region has shown the smallest progress[11], rising its institutional delivery rate from 34 per cent in 2000 to 624 per cent in 2009.

Figure 2
Institutional Delivery Ratio, by Regions
Peru: 2000 and 2009
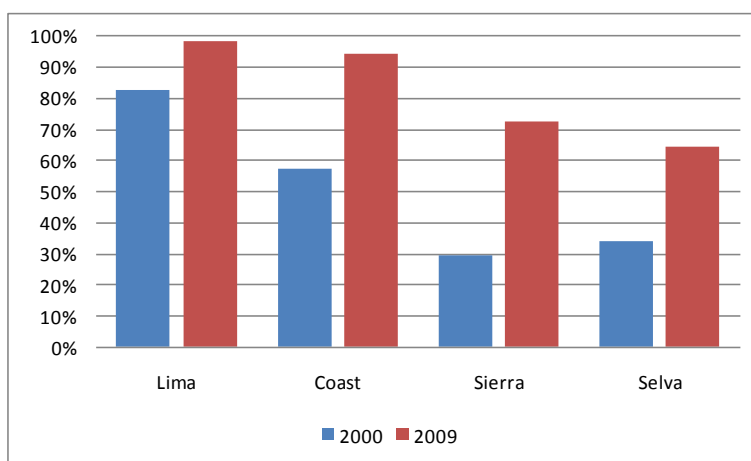
Source: ENDES 2000, 2009.

When wealth and region of residence data is analyzed together, it is evident how concentrated the ID deficit is: the lowest rates are found in the lowest income quintile for all three regions — Coast (77 per cent, excluding Lima), Sierra (50 per cent) and Selva (35 per cent). The worst situations are found in the Sierra and Selva where we find low ID rates for the second lowest income quintile as well.

Table 1
Institutional Delivery Ratio, by Wealth Quintile and Natural Region
Peru: 2009

Region/Wealth quintile	Lowest	Second	Third	Fourth	Highest
Lima	N.A.	98	96	98	97
Coast	77	86	96	96	97
Sierra	50	68	88	93	99
Selva	35	76	93	99	93

Source: ENDES 2009

Moreover, ENDES 2009 data shows rural areas in the Sierra and Selva have lower ID rates than in urban areas of these regions. For instance, while in the urban area of the Selva region 83 per cent of the deliveries are institutional, only 43 per cent are institutional in the rural areas of the same region.

To further analyze the differences in ID by area of residence, it is useful to include two variables to proxy the quality of ID: caregiver capability to lead the delivery as well as the type of health establishment. In terms of caregivers[12], the left panel of Table 2 shows a relatively higher participation of doctors and obstetricians for institutional deliveries in urban areas (in total 76.0 per cent compared to 40.3 per cent in rural areas). Nurses, traditional health attendance and the "other" categories are more common in rural areas, even though there is nothing certain about the level of skills in the "others" category[13].

When one looks at the health establishment by area of residence, the right panel of Table 2 shows that roughly one out of two women deliver their children in MINSA hospitals in urban areas, while roughly one out of four do so in rural areas. The first most important place to give birth in rural areas is at home (41.5 per cent). This fact implies a high risk for women and their babies because of complications not attended by professional staff in an adequate environment.

Notice also that 13.5 per cent of rural women give birth in MINSA's health posts even though they are not considered fit to attend deliveries because of their low capacity to attend complications. This is almost seven times the proportion of urban women giving birth at posts. Inequalities in access to health services between populations living in different areas are thus evident. Further, given that the best place where to give birth is in a hospital, and the worst is at home or in an "other" establishment, it becomes clear that urban populations do not only have more access to delivery health services, but receive also better quality services.

Table 2

Births by caregiver and area. Peru: 2009		
Caregiver	Urban	Rural
Doctor	63.1	24.4
Nurse	18.3 t	20.7
Obstetritian	12.9	15.9
Health Especialist	0.1	1.7
Traditional Birth Attendant	2.8	16.4
Other	2.7	20.3
None	0.1	0.6
Total	100.0	100.0

Source: ENDES 2000, 2009.

Births by health establishment and area. Peru: 2009		
Establishment	Urban	Rural
At home	5.9	41.5
Midwive's home	0.2	0.3
MINSA Hospital	48.3	23.2
ESSALUD Hospital	14.9	2.1
FF.AA./PNP. Hospital	0.6	0.0
MINSA Health Center	13.8	16.5
MINSA Health Post	2.0	13.5
ESSALUD Post/Center	1.7	0.1
Private Practice	11.5	1.3
Other	1.2	1.6

Source: ENDES 2000, 200

Institutional delivery and women characteristics

Other indicators that allow identifying marginalized groups in ID are related to the mother and the household characteristics. Here the mother's highest completed level of education, mother tongue, and household's wealth quintile from ENDES are considered.

ID growth has been important at all educational levels, with the lowest levels experiencing the fastest growth in the last decade. Nevertheless, there are still important differences: while institutional delivery is above 96 per cent for women with tertiary education, only one out of two deliveries is institutional for women without education and only 63 per cent for those with primary education Data shows that secondary education increases the likelihood of having an institutional delivery. Indeed, while women with primary education have an ID ratio of 63 per cent, the ratio for women with secondary education surpasses 90 per cent.

In terms of ID rates across different mother tongues —as a proxy to analyze ethnicity— there have been important increases for Spanish speakers who have seen their ID rates increase from 55 per cent in 2000 to 82 per cent in 2009. In comparison, Quechua speakers saw an increase from 13 per cent to 60 per cent and Aymara speakers improved their ID rates from 12 per cent to 51 per cent during the same period. However, for other indigenous minorities living mostly in the Amazon areas, ID rates are terribly low: just one out of nine women speaking other indigenous languages had an institutional delivery in 2009.

Access to ID has improved more among the poorest since 2005. The lowest income quintile ID ratio increased from 27 to 49 per cent, while the two higher quintiles made almost no improvement as they already had rates above 90 per cent. Even after this improvement among the poorest, moving from the lowest to the second lowest quintile increases in more than 27 percentage points the likelihood of having an institutional delivery; and moving from the lowest second to the third quintile increases it in roughly 18 percentage points. The likelihood continues increasing when moving up to higher income quintiles, but at a slower rate.

A model on institutional delivery

At first glance, it is difficult to identify the relative importance of the different marginalization factors linked to access to institutional deliveries. To solve this problem, this policy paper offers a statistical study of the effects of these factors on the probability to have an ID.

It is assumed that each woman expects both benefits from giving birth in a health establishment (e. g. reduced probability of dying or better health for the infant) and costs (e. g. transportation costs or cultural impact of the delivery). One can call the difference between the benefits and costs the utility that the woman receives from the institutional delivery (y*). The woman will choose an institutional delivery if the utility is positive. The unobservable utility a woman gets from institutional delivery can be expressed as followed:

$$y_i^* = \alpha + \beta_1 Educational\ Level + \beta_2 Native\ Language + \beta_3 Natural\ Region + \beta_4 Rural\ Area + \beta_5 Wealth\ Quintile + \beta_6 Doctors + \beta_7 Nurses + \beta_8 Obstetricians + \beta_9 Hospitals + \beta_{10} Mid\ level\ establishment + \beta_{11}\ Low\ level\ establishment$$

and $\text{Pr}(institutional\ delivery) = \text{Pr}\left(y_i^* > 0\right)$.

Where:
- "Educational level" is a discrete variable which values go from one (no education) to four (tertiary education).
- "Native   language"   includes   dichotomic
- [14] variables for each native language in the sample (Quechua, Aymara and other indigenous).
- "Natural Region" includes dichotomic variables for the region where the household is located.
- "Rural Area" takes the value of one if the household is located in a rural area and zero otherwise.
- "Wealth Quintile" is a discrete variable that goes from one to five representing the wealth quintile of the family. Unfortunately, the data base didn't have the actual value of the wealth indicator, only the quintile.
- "Doctors" shows the number of doctors available for every 1,000 residents in the district. The variables "Nurses" and "Obstetricians" work in the same way.
- "Hospitals" shows the number of hospitals available for every 1,000 residents in the district. The variables "Mid level establishment" and "Low level establishment" work in the same way.

Finally, μ is the estimation error.

Data come from the ENDES 2009 and from the Ministry of Health information on health establishments and professionals. The supply information includes the ratios of doctors, nurses, obstetricians and hospitals per 1,000 habitants as well as the other categories of health facilities available in each district.

Table 3 shows the result of the estimation. The strongest negative effect on institutional deliveries is found for the native language: indigenous minorities and Aymara speakers have an important disadvantage compared to Spanish speakers. Aymara speakers' probability of having an institutional delivery is 40 per cent lower than that of a Spanish speaker and the probability of indigenous minorities is only 20 per cent that of Spanish speakers[15]. Generally speaking, ethnicity appears to be a significant factor to consider when advocating for ID; in this sense, cultural barriers are essential and need to be taken into account.

Another important negative effect is experienced by women living in the Sierra and Selva regions: their probability of having an institutional delivery is around one third of the probability of women in the Costa and in Lima. Additionally, living in rural areas has a negative effect, reducing the estimated probability to around 60 per cent less than that of women in urban areas. Thus, geographic location—and the accessibility barriers related to it — affects negatively ID.

On the other hand, each increase in the wealth quintile of the woman giving birth increases the probability of institutional delivery in roughly 78 per cent. In this respect, this analysis shows the economic barrier to be an important limitation to ID.

As for the effect of educational attainment, the model finds that increasing the educational achievement by one level increases the probability of having an institutional delivery in 84 per cent.

On the supply side, we find that the presence of a hospital in the district greatly increases the probability of institutional delivery. Other kinds of health facilities show no significant effects on ID —even though those are the most common health establishments available in rural areas—, probably due to the low capacity to deal with complications. This fact is important because it could reflect the low complication solving capacity of the health establishments and the need for capital investment: more than half of health establishments in Peru have the lowest complication solving capacity, with a very narrow capacity to solve problems during the delivery.

Finally, the numbers of nurses and obstetricians available at the district level presents an important effect on institutional delivery.

Table 3
Odds ratio on the probability of having an institutional delivery
Peru: 2009, logistic estimation

Variable	Odds Ratio	Std. Err.	z	P>z
Sierra	0.33***	0.04	-9.25	0.000
Selva	0.3***	0.04	-10.17	0.000
Rural	0.43***	0.04	-9.19	0.000
Wealth Quintile (values from 1 to 5)	1.78***	0.10	10.37	0.000
Education Level	1.84***	0.12	9.68	0.000
Native Language: Quechua	1.58***	0.15	4.72	0.000
Native Language: Aymara	0.6**	0.15	-1.97	0.049
Native Language: Other indigenous	0.19***	0.04	-8.38	0.000
Native Language: Foreign	0.79	0.48	-0.39	0.697
Doctors x 1000 residents	1.07	0.10	0.74	0.461
Nurses x 1000 res.	1.21**	0.10	2.35	0.019
Obstetrician x 1000 res.	1.43***	0.17	2.96	0.003
Hospitals x 1000 res.	102491***	274066.90	4.31	0.000
Mid level health establish x 1000 res	1.24	0.47	0.57	0.570
Low level health establish x 1000 res	1.03	0.09	0.4	0.687
Observations	10,220			
Correct Predictions (percentage)	83.11			

* Statistically significant at 90 per cent confidence.
** Statistically significant at 95 per cent confidence.
*** Statistically significant at 99 per cent confidence.
Source: ENDES 2009.

Concluding remarks

The analysis presented in this policy paper supports four important conclusions. First, the strong negative effect in ID rates associated with Aymara and other indigenous native languages (excluding Quechua) gives us evidence that specific cultural barriers could have prevented these groups from attending the appropriate establishments for the delivery.

Second, the disadvantage found for women living in the Sierra and Selva regions, as well as the rural areas, highlights the pervasive effects that some access barriers are generating. Particularly, as these regions are precisely those in which the geography implies disperse population and difficult transportation, attention is called to develop new models to deliver services, including contracting with churches and other NGOs that are already providing medical services to the population.

Third, the positive effect that wealth and education have over the probability of having an ID suggests that some effort should be made to improve the household incomes. The already existent conditional cash transfer program goes in the right direction but it is not enough as the poorest people continue to display relatively low ID rates.

Finally, the absence of statistical effects for the number of lower level health establishments suggests that these are not currently helping to increase institutional delivery. In light of this information, some changes could be made to make current establishments more effective in improving the population's health.

Recommendations

Three important barriers to institutional delivery are found in Peru: economic, accessibility and cultural barriers. Although efforts have been made to address these, policies have primarily been geared toward economic ones. Furthermore, due to their lack of cost-effectiveness, they have not yielded the expected results.

To keep reducing the economic barriers, ID could be added as a condition for the conditional cash transfer (CCT) program *Juntos*, following the Indian and Bolivian examples[16]. Thus all conditions —the already pre and post natal controls conditions as well as ID— should be accomplished by the family to be eligible for CCT.

Although this kind of CCT program has proved to be useful, supply considerations have to be taken into account before launching them. Pre and post natal evaluations would need to be available for the population and health facilities could make sure they are able to receive the increased number of patients and treat them accordingly. The statistical insignificance of the presence of low and mid level health establishments is, in fact, revealing. These establishments form the bulk of the health net in the country. An important effort to increase their impact on ID could be made and the complication solving level of the health posts could be extended so that a wider range of problems can

be addressed. Moreover, the Ministry of Health as well as its regional directions need to implement new models to deliver services, outsource services —such as laboratory and blood banks— and contract with different health private or non-profit institutions —such as churches in the Selva region using floating hospitals, for instance. All resources already in place —private and public— need to be use before constructing new health establishments.

Supply considerations relate to accessibility barriers as well, particularly in the Amazon region where geographic dispersion and high transportation costs reduce the possibility to access health establishments in order to get an adequate attention during delivery. This is a daunting challenge as both policies require high levels of public investment. An important experience that helped reduce this problem and that could be expanded further is found in ,the "waiting houses." Pregnant women can go to these houses some weeks before giving birth and wait for the delivery time closer to a health establishment.

Cultural and language barriers are important too, as shown by the major disadvantage indigenous minorities face. To address these barriers, the government could expand culturally adequate deliveries. This adequacy is based on improving the comfort of the pregnant mother during delivery. These culturally sensitive practices include vertical delivery —a form of delivery in which the mother gives birth standing up, rather than lying down—, the capability of burying the placenta, the presence of relatives during delivery, adjusting temperature of the room to the mothers convenience (rather than the doctor's), among others.

Endnotes

[1] UN (2008). The Millennium Development Goals Report: 2008. United Nations. Geneva, 2008. Available in: http://www.un.org/millenniumgoals/2008highlevel/pdf/newsroom/mdg per cent20reports/MDG_Report_2008_ENGLISH.pdf

[2] Costello A, Osrin D, Manandhar D (2004) Reducing maternal and neonatal mortality in the poorest communities. BMJ 329: 1166–8.

[3] ENDES, the Peruvian official source for maternal and infant health information, doesn't have information regarding the place of birth in its maternal mortality section. Therefore, no comparison can be made of maternal death when the delivery was at home versus maternal death if the delivery was institutional.

[4] Ministerio de Economía y Finanzas –MEF— — 2008. Programa Estratégico de Salud Materno Neonatal.

[5] Graham WJ, Bell JS & Bullough CH. (2001). Can skilled attendance at delivery reduce maternal mortality in developing countries? Studies in Health Services Organisation and Policy, 17, 97-130.

[6] These estimations are calculated upon the deliveries attended by skilled personnel (doctors, nurses or midwifes). However, throughout the document, we use "Institutional deliveries" to refer deliveries attended by skilled personnel and inside a health establishment; these definition is apposite and give better insights on the Peruvian maternal attention.

[7] The specific indicators for this goal are: 1). To reduce MMR from 185 to 120 per 100,000 live births by 2011. 2). To reduce MMR to 66 per 100,000 live births by 2020. 3). To increase the rate of institutional delivery coverage in rural areas from 42.9 per cent to 70 per cent by 2011, with quality and within the cultural context of the population (Peruvian Ministry of Health (2007). *National Coordinated Health Plan*. Page 21).

[8] The program seeks to reduce maternal mortality and morbidity through: 1). Increase access to quality prenatal services for pregnant women. 2). Increase proportion of deliveries in qualified health establishments. 3). Increase access to establishments with the right capacity to solve basic, essential and intensives obstetric emergencies. 4). Raise access to the net of hemotherapy centers. 5). Strengthen the reference system concerned with its organization, operations and financing.

[9] According to a 2009 evaluation on the progress of the PSMN (done by *Comisión de Seguimiento Concertado del PSMN*), budget was not assigned to health infrastructure, improvement of resolute capacity of health facilities and blood banks. This evaluation also highlights an uneven distributed budget along different regions. Finally, this evaluation also suggests needed improvements in hemotherapy through investment in "access of pregnant women to safe blood" and "blood Banks".

[10] MMR in Peru is estimated using information about the death of siblings caused by pregnancy reported by women surveyed in the ENDES. An important limitation of ENDES is, however, the limited amount of observations. Replications of the estimates show that some desegregations use as little as two observations (the national estimation for 2009 used a total of 218 observations).

[11] Besides Lima, but that is explained because of its almost 100 per cent institutional delivery ratio.

[12] Doctors and obstetricians are the first in the ranking, followed by nurses, health specialists (sanitarios), traditional birth attendants and the rest of possible caregivers, including health auxiliary personnel, technicians, friends or family, among others.

[13] The "Others" category is constructed in this case considering deliveries attended by a "health worker" (not a specialist), a friend or relative or the "others" category of ENDES which is any uncoded person. The proportions of these differ by area of residence. In the aggregate, the proportion of relatives or friends is higher than the rest of the categories, while in the urban zone the "others" are more important. For the rural area, the relatives or friends are the main component of the proportion shown in Table 1.

[14] A dichotomic variable can only take the values of 1 and 0. For example, a dichotomic variable for Native Language: Quechua will be 1 for the women that speak that language and 0 for the ones that don't.

[15] Surprisingly, Quechua speakers are found to be better off than their Spanish counterparts. It is probably a consequence of the immigration of this ethnic group into bigger cities, compared with other non Spanish speaking groups.

[16] Lim, Stephen, Lalit Dandona, Joseph A Hoisington, Spencer L James, Margaret C Hogan and Emmanuela Gakidou (2010). "India's Janani Suraksha Yojana, a conditional cash transfer programme to increase births in health facilities: an impact evaluation" Lancet 2010; 375: 2009–23. Moloney, Anastasia (2010). "Difficulties hit Bolivia's programme for pregnant women" Lancet 2010; 375: 1609–23