ANALYSIS OF POTENTIAL ADVERSE EFFECTS OF PERFORMANCE BASED FINANCING IN RWANDA: THE CASE OF REFERENCE OF AT RISK PREGNANT WOMEN

HAFASHIMANA Valens[1], *UMUBYEYI Aline*[1], *BASINGA Paulin*[1]

1. National University of Rwanda, School of Public health, Rwanda

ABSTRACT

Objective: The overall objective is to look up the perverse effects of PBF in the management of deliveries in health facilities especially the appropriateness of transfers from health centers to referral hospitals in two health districts of Rwanda.

Methods: A descriptive and retrospective study carried out on transfers of deliveries from health centers towards reference hospitals comparing two districts of Rwanda, Kamonyi and Rwamagana from 2006 to 2008. Criteria for classifying a relevant and non relevant have been constructed.

Results: A significant increase of institutional deliveries was observed for both non PBF district from 2006 to 2008 as well for the references of complicated deliveries from health centers to districts hospitals. During three years, there has been a non significant increase of the proportion of transferred women for deliveries as non relevant references at Rwamagana (PBF) with a difference of 4% while at Kamonyi (non-PBF), this increase have been significant with a difference of 15%. Thus, in PBF area, there were less non relevant transfers than elsewhere even if the remuneration was the same for a delivery performed at health center and for the one referred.

Conclusions: Institutional deliveries and transfers of women have been increased from HC to DH. Potential perverse effects in the case of referring women for maternal reasons were frequent in the non PBF area. The reinforcement of PBF by stakeholders by continuous monitoring and improvement of the management of pregnant women by health facilities is recommended. The research of this kind at national level is highly recommended.

Keywords: ***Assisted delivery, partogram, performance-based financing, relevant transfer, transfer***

Introduction and background

The maternal mortality rate is still high worldwide and particularly in the developing countries including Rwanda which counted 750/100000 live births in 2005(Institut National De La Statistique, 2005). Some of the estimation of maternal deaths shows a total of 536 000 maternal deaths worldwide and developing countries accounted for 99% (UNICEF, 2008).

Nowadays several strategies like basic emergency obstetric care, coverage and quality of skilled attendance at birth, post-abortion care, safe abortion, better reproductive health services for adolescents, family planning care, new developments in malaria, nutrition, violence and HIV/AIDS in relation to maternal health, human rights approach(Campbell & Graham, 2006) as well as Performance Based Financing (PBF) have been developed to improve maternal and child health. Those strategies were developed in the context of the achievement of two Millennium Development Goals (MDGs) in relation of the reduction of the infantile mortality and the improvement of the maternal health.

One promising intervention to improve worker productivity is to pay for performance (P4P), which provides incentives in the form of premiums to health care providers for improvements in the use and quality of care indicators. P4P may affect medical care in two ways: first by motivating providers to put much more effort in the specific activities, and secondly by increasing the amount of resources available to fund the provision of services (Borghi, Ensor, Somanathan, Lissner, & Mills, 2006). A multicenter study in Rwanda, Benin, Jamaica and Equator showed that the knowledge and skills of health personnel to deal with obstetric emergencies were very weak and fall to 40-60% of standard norms (Abouzahr C &T, 2001).

In Rwanda, at the demand side the government through the Ministry of Health implemented the "mutuelle de santé" and the PBF at the supply side a strategy to motivate health care providers in the public sector to improve the quality of services of health facilities in order to achieve the MGDs. The PBF being an approach related to results, efforts and undertaken initiatives to achieve it, has been generalized at national level where it covers all the minimum package activities as well as the HIV/AIDS services. In the case of deliveries, 2 indicators are remunerated by PBF that are assisted delivery at health center and emergency transfers to hospital for obstetric care during delivery (Rwanda Ministry Of Health (MOH) [Rwanda], 2009).

After showing its efficiency in the increase of the quantity of the activities since the years 2002 by the pilot phases in the south of the country (Basinga, Gertler, & Vermeersch, 2010; Meessen, J.-P. I. Kashala, & Musango, 2007; Meessen, Musango, J.-pierre I. Kashala, & Lemlin, 2006), it has been extended at national level in 2006.

Because the country of Rwanda is one of the countries where the PBF especially showed its efficiency, other countries are looking at Rwanda as the first country to have implemented PBF national wide, it's important to share less in learned from the Rwandan experience to others countries. Nowadays, more than 20 countries are in the process of introducing or scaling up PBF in Africa especially in neighboring countries like Burundi and Democratic Republic of the Congo, Cameroon, Benin etc...(Bruno Meessen, 2011; Soeters, Habineza, & Bob, 2006).

As they have been an impact PBF on health in Rwanda, some authors think that there are side effects but there is no evidence shown for Rwanda. One of them is Kalk where in his conclusion he argued: "*Finally, it can be stated that P4P in Rwanda successfully promoted those activities with incentives attached, brought about considerable side effects such as 'gaming' and created a new spirit of labour whose appropriateness will remain a topic of discussion*" (Kalk, Paul, & Grabosch, 2010).

Even though this strategy of PBF had been efficient, it makes itself that it can generates perverse effects. Who knows that some health providers would be looking to benefit the PBF like a tool of fraud? Who knows that some health facilities would not be thinking in term of money than the quality of the cares, especially in the case of safe motherhood (maternal health), and to make transfers useless of the health center toward the hospitals of reference as well as the purchase of a childbirth well done at the level of health center and a transfer toward a superior structure have the same amount of money of Rwf 2500? Or who knows that some health facilities don't keep women uselessly in labor of childbirth whereas they are not capable to take them in charge? Such behavior in the case of maternal health (motherhood) would be dangerous. This was our problematic question and the reason of this study was to see if there would not be perverse effects of the PBF intervention in the case of the maternal health.

RESEARCH QUESTIONS OR PROBLEM STATEMENT

In Rwanda, it was shown that the PBF progress were significant in quantitative terms for the whole of the activities remunerated by this approach. The most notable increases were at the level of maternal health and it moreover was shown that the installation of the contracts of performance involved big rises of the productivity of the personnel (Basinga, Gertler, & Vermeersch, 2010; Meessen, J.-P. I. Kashala, & Musango, 2007; Meessen, Musango, J.-pierre I. Kashala, & Lemlin, 2006; Rwanda Ministry Of Health (MOH) [Rwanda], 2009) . Basing itself on these results, the Rwandan government decided to extend this strategy at the national level with the support of the various basic financial donors and NGOs.

One of the basic principles of PBF is to pay (remunerate) health facilities based on the number of procedures performed. In terms of delivery, two services were selected: the simple childbirth at the health centre and the transfer of a woman in labor towards a reference level (Rwanda Ministry Of Health (MOH) [Rwanda], 2009). For each one, remuneration was fixed at around USD 5 (2500 RWF), which is very attractive for a health provider. From the beginning, it was understood that the increase in the number of childbirth on the level of the health centers was not an aim in itself but is was primarily seen as the best channel to increase the detection of laboring women parturient requiring reference towards a hospital for further care. Thus, the remuneration of the transfers was motivated by the pursuit of the goal of reducing maternal mortality and the corollary desire to prevent any perverse effect on the level of the health centers (retention of women requiring a reference by attraction of money).

It is important to assess the soundness of these objectives, the quantitative increase not being an aim in itself. In fact, if the aim needed is to push the teams of the health centers to take positive measures to increase the number of assisted childbirth (e.g.: integrating services, establish night guards, recruiting qualified health providers,…), it is possible that some teams may also adopt more dangerous options for the health of the mothers and the children. In order to increase their incomes, certain health centers might be tempted to do more than they really are capable of both technically and in practice (number and qualification of the personnel, material available). The risk is particularly real for the parturient requiring more specialized care as is the case for dystocic deliveries.

According to the health system in Rwanda, health centers are authorized only to carry out normal deliveries and the complicated one must be referred to district hospital for example the suction cups, scar of the uterus, transverse presentation, etc. As already mentioned, it was decided to remunerate the health centers even if the woman had only passed through the health center. If it was expected that this incentive will prevent the risk of retention of women in labor (and reduce the number of "false negative", women not transferred which should have been transferred), it might also lead to unnecessary transfers (increased 'false' positive, transferred women which did not require an evacuation). Insofar as the PBF were a new experience, the designers took caution by accepting that the medical profit may involve a cost in terms of efficiency (namely the useless expenditure charged to the household, government and of NGOs for non-necessary transfers).

We should think ourselves if health centers are not being referring pregnant women for deliveries at district hospital only because it is easy instead of performing a delivery at health center when the amount remunerated are the same? Or even, who knows that some health facilities don't keep women uselessly in labor of childbirth whereas they are not capable to take them in charge?

If it is proven that the number of evacuations has actually increased sharply (Basinga, Gertler, & Vermeersch, 2010; Meessen, Musango, J.-pierre I. Kashala, & Lemlin, 2006) , it would be useful to check all these evacuations up to what point were relevant. Otherwise, the PBF program would be creating some perverse effects for these health facilities by doing what is not in their competences or by referring deliveries without problems in order to be not tired itself (reduce the work because remuneration of a delivery and a referred one is the same).

It's now well known that the performance based-financing had shown the effectiveness or impact in addressing maternal health and in Rwanda since his implementation in 2002; there have been an increased institutionalized deliveries. In 2006, Robert Soeters et al showed that the percentage of institutional deliveries conducted by skilled persons in Rwanda increased and there have been a difference 2005/2003 of 144% (Soeters, Habineza, & Bob, 2006). Rusa et al in 2001 (Rusa, Schneidman, Fritsche, & Musango, 2009) found the same increasing of institutionalized deliveries with PBF. Basinga Paulin found also that the PBF were having also an important impact on the proportion of assisted delivery where from 2006 to 2008, facilities increased the proportion of institutional deliveries by 13% (Basinga et al., 2011; Basinga, Gertler, & Vermeersch, 2010).

Meessen B et al showed main possible effects of output-based payment on other dimensions of health centre performance at each incentive such as to inflate records for the remunerated activities, to induce unnecessary demand for the remunerated activities, to neglect activities that are not remunerated, to neglect quality attributes, on the basis that only quantity matters, of the activities that are delivered. For Rwanda, they respond to **s**ome observers who have raised the concern that buying outputs may induce a shift in staff values or expectations (e.g. create the perverse perception that any behavior deserves a specific payment) because to avoid this problem, the bonus contracts in Kabutare clearly refer to medical ethics and describe possible sanctions that would be imposed in case of fault (Meessen, J.-P. I. Kashala, & Musango, 2007).
For Meessen &al, Performance-based financing has limits (some dimensions of performance are difficult to measure and, therefore, to remunerate) and is difficult to design and implement correctly while some conditions are necessary for its success. They continue to show that according to their experience, the PBF can catalyse comprehensive reforms and help address structural problems of public health services, such as low responsiveness, inefficiency and inequity (Bruno Meessen, 2011).

Contrarily, some authors like Cynthia Eldridge and Natasha Palmer do not believe in the improvement in health attributed to Performance-based payment (PBP) because of the lack of controls and the interference of confounding factors and they seem to be convinced that PBP may not be solely responsible for improvements in health indicators(Eldridge & Palmer, 2009).
Other critics are being made by researchers and arguments advanced are the phenomena known as "gaming" (distortion of information to maximize reported results and neglecting activities not remunerated by the PBF) (Kalk, Paul, & Grabosch, 2010).
Kalk & al wrote about Rwanda that: "*The question arises if the promoted P4P schemes are not just second-class substitutes for such a way of appreciating labour. This question is even more valid as most of the side effects of P4P schemes (such as 'gaming') are clearly to be observed in Rwanda: overworked staffs invest all their energy into the remunerated activities and their proper documentation, and tend to neglect other core tasks for the sake of the incentives*" (Kalk, Paul, & Grabosch, 2010).

In Rwanda, the ministry of health, after having analyzed the success of the pilot experiments, initiated the national roll out of the PBF program in 23 districts starting 2006 and Rwamagana is among the districts that started in 2006. In 2008 the remaining 7 control districts also implemented PBF where Kamonyi district is one of them. It is important to ensure the relevance of this strategy and to identify the potential risks (possible hazards) of them by evaluating the quality of care of the cases since the periphery (health centers) up to the district hospital level of the health pyramid of Rwanda.

It is worth answering these questions by ensuring the relevance of transfers in the management of deliveries at Kamonyi as a non-PBF district and Rwamagana as a PBF district because we know that the PBF is currently having a major influence on health policy in Rwanda.

Materials and Methods

A descriptive retro-prospective study for deliveries referred to districts hospitals conducted in two districts a non PBF and a PBF district during the years 2006, 2007 and 2008. District were randomly selected picking one from phase 1 (which started PBF in 2006) and 1 districts of phase 2 (which started PBF in 2008)

The study was carried out on 1549 women transferred from health centers towards district hospitals in two districts from all health facilities providing assisted deliveries which we found a partogram or a reference paper while other were excluded.

We assumed that all the interventions are the same except the PBF intervention such CHWs program, community based insurance, the sensitization by the political-administrative authorities, the behavior communication change, the improvement of geographical access of services, etc.

Data collection was done at the level of the District Hospital with the research of all obstetric transfers for deliveries: a questionnaire designed based on variables available to the level of the partogram and transfer paper of the health centers as well as the registers, medical record of the patients and the partogram on the level of district hospitals and was tested before use. A recommendation letter for data collection helped us to collect them with ethical considerations.

A database was made on EPI INFO Version 3.3. October 5.2004 and was used for data entry, then the base was transferred to SPSS for final analysis. Some variables with the codes were pre-

coded on data collection phase to facilitate the keyboarding of data and others were coded in SPSS. Some tests of chi-square were calculated using the Epitable for comparing the two districts according to the three years 2006-2008. A p-value less than 0.05 were considered as significant.

Our study presents some limits as it is a retrospective study. The total number of transfers of women from Health centers to district hospitals might be underestimated by lack of data because of by bad medical record keeping or women transferred might went to the other hospitals without passing to their district hospital. Comparison of two districts even though those two districts cover many health centers there might be an issue of intracluster correlation.

Variable definitions:

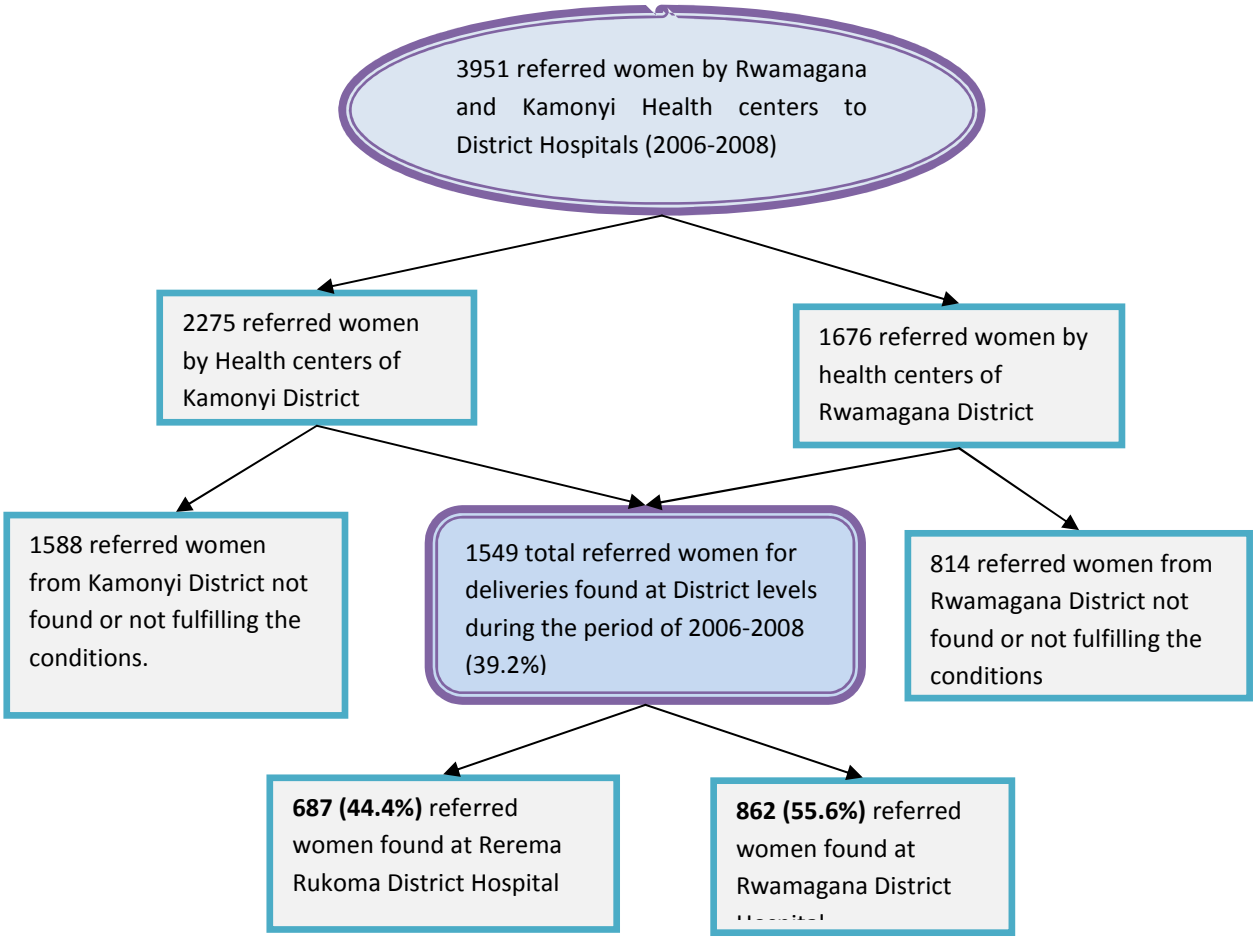
Transfer (or reference): Reference is an evacuation towards a specialized center of a pathology in which the treatment is beyond the capacity of the antenatal consultation team (we have used transfer as the same as reference). In other words, ***transfer*** means the physical transfer of a woman from primary maternity unit or home to a base hospital before, during or after labor (NEW ZEALAND COLLEGE OF MIDWIVES, 2008) **.**

Relevant transfer: To know if a transfer from a health center to district hospital is relevant or non relevant, we have used some criteria. Criteria for classifying reference as relevant or non relevant were picked according to the scheme of health system in Rwanda and at a scientific base regarding maternal health (obstructed labor, mechanic and dynamic dystocia, postpartum hemorrhage, scar of the uterus and uterine abnormalities, etc) (De Tourris H, Mangin G, 2000; Southern Health, 2009). Thus, we had retained as a "relevant transfer"' all women transferred for obstetric reason to the district hospital which met at least one of the criteria in the box 1 and others were considered as "non-relevant transfer".

Box 1: Criteria for classifying reference as "relevant" or "not relevant" for health centers referring to district hospital level

- To be operated (cesarean sections, hysterectomies and laparotomies);
- To have had a dystocic delivery or instrumental (forceps / suction cups, twin pregnancy with manual procedures, breech presentation with manipulation);
- To have had a diagnosis of postpartum hemorrhage in hospital;
- To have had a dead baby macerated or stillbirth or death within 24 hours to the district hospital;
- Being dead at the district hospital or referral hospital;
- Have a child who has had specialized care (oxygen, radiation, infection ...);
- Have had an obstructed delivery (vacuum extraction, forceps, breech presentation and twin pregnancy with manual);
- Have had a diagnosis of retained placenta;
- Have been transferred to another hospital for a relevant cause;
- Arrived with or developed a shock to the District Hospital;
- The baby have had a low Apgar at first minute (0-3);
- Having received oxytocin at the hospital (except for the expulsion of the placenta);
- Having received Cytotec at the hospital for labor induction;
- The baby had a low birth weight;
- Have had at least one previous uterine scar and having uterine rupture.

Figure 1: Number of referred women for deliveries at Remera Rukoma and Rwamagana during the year 2006-2008.

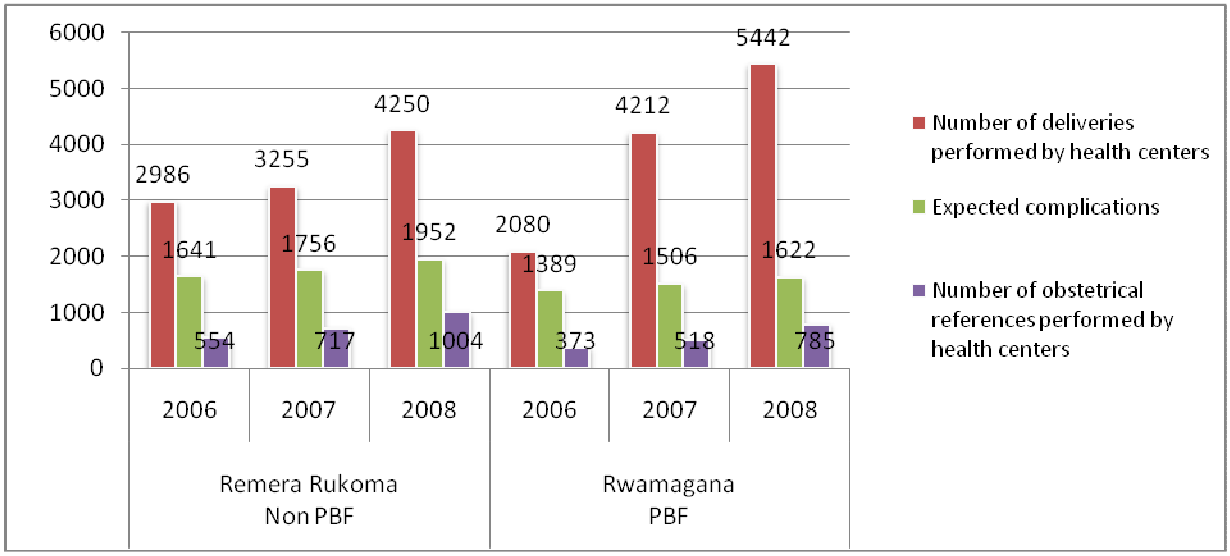


The figure shows the way of the women referred from health centers to district hospital during the period of 2006 to 2008 and how they have been found at that level. Total, 3951 women were referred by Rwamagana (PBF) and Kamonyi (Non PBF) Health centers to District Hospitals according to the data found in the monthly report of health centers in the Health Management information system. Among them, 1549 (39.2%) were found at District levels (39.2%) and included in our study in which 687 (44.4%) were from a non PBF district (Rerema Rukoma) and 862 (55.6%) from a PBF district (Rwamagana) and others were not found.

RESULTS

After analyzing our data, we have come out with some results presented below accordimg to our specific objectives: Proportion of women who are transferred from health centers for maternal causes and who can be found at the district hospital levels, proportion of concordant causes of transfer between district hospital and health centers, proportion of "relevant references" of women with complication from health centers.

Figure 2: Number of deliveries performed and referred deliveries by health centers from 2006 to 2008



This figure shows the evolution of deliveries at health centers, expected complications and references of women to district hospitals during the period of 2006 to 2008; for all, there have been increases in both PBF and Non PBF districts:

The institutionalized deliveries had increased from 2986 to 5250 deliveries (27.3% to 32.7%, an increase of 5.4%) in health centers of Kamonyi District and from 2080 to 5442 (22.5% to 50.3%, an increase of 27.8%) in health centers of Rwamagana District respectively in 2006 and 2008.

For referred women for deliveries, there has been also an increase from 554 to 1004 referred pregnant women at risk for deliveries (33.8% to 51.4%, an increase of 17.6%) in health centers of Kamonyi District and from 373 to 875 (26.9% to 48.4%, an increase of 21.5%) in health centers of Rwamagana District respectively in 2006 and 2008.

In BBF district, the increase is impressive either for institutionalized deliveries or referred women for emergency cases during labor for deliveries.

Table 1: Comparison of reasons of transfer by HC with indications/diagnosis at district level by year of admission.

Admission year	Reasons are comparable with diagnosis at District Hospital level?	Kamonyi Non PBF District		Rwamagana PBFDistrict		Total		P Value
		N	%	N	%	N	%	
2006	No	112	61.2%	155	73.8%	267	67.9%	0.008
	Yes	71	**38.8%**	55	**26.2%**	126	**32.1%**	
	Total	183	100.0%	210	100.0%	393	100.0%	
2007	No	63	46.7%	59	50.9%	122	48.6%	0.507
	Yes	72	**53.3%**	57	**49.1%**	129	**51.4%**	
	Total	135	100.0%	116	100.0%	251	100.0%	
2008	No	187	35.6%	111	29.5%	298	33.0%	0.058
	Yes	339	**64.4%**	265	**70.5%**	604	**67.0%**	
	Total	526	100.0%	376	100.0%	902	100.0%	
P-value			**0.000**		**0.0000**			

The table shows if the reasons of transferring pregnant women at risk for deliveries were comparable with the diagnosis at district hospital assuming that the diagnosis at district hospitals is the most correct one than that one from health centers.

During the years 2006, 2007 and 2008, there has been an increase in comparison of reasons of transfer of a health center and diagnosis at district hospital in both districts from 32.1% to 67.0% (about 2 times from 2006 to 2008).

If we compare health centers with district, we have realized the increase of the comparability of the diagnosis in both districts and the difference is highly statistically significant in both districts (p=0.000): In Kamonyi district (non-PBF), through three years, the proportions of how reasons were comparable have been increased 1.7 times while in Rwamagana district, that proportion had also increased 2.7 times.

Comparing districts during the period of our study, the proportion of comparable reasons for transferring pregnant women at risk for deliveries between health centers and district hospitals were high in Non PBF (38.8%) in 2006 than in PBF (26.2%) as well as in 2007 (53.3% at Kamonyi versus 49.1% at Rwamagana). Contrary in 2008, the proportion was higher in PBF

district than in non PBF district (70.5% at Rwamagana versus 64.4% at Kamonyi**).** The difference is statistically significant in 2006, the beginning of PBF at Rwamagana district (p=0.008< 0.05) while it's not for 2007 (p=0.507 > 0.05) and 2008 (p=0,058 > 0.05).

The diagnoses which were comparable between health centers and district hospital were: mechanic and dynamic dystocia, normal deliveries, acute fetal distress, scar of the uterus and uterine abnormalities, dystocic presentation, etc.

Table 2: Indicators of the use of emergency obstetrical services at District levels

	RWAMAGANA DISTRICT (PBF)				KAMONYI DISTRICT (Non-PBF District)			
	2006	**2007**	**2008**	**p-value[6]**	**2006**	**2007**	**2008**	p-value[6]
Information on population								
a. Population[1]	205724	223141	240265		243051	260073	289174	
b. *Crude Birth rate* [2]	0.045	0.045	0.045		0.045	0.045	0.045	
c. *Expected deliveries* (a x b)	9258	10041	10812		10937	11703	13013	
d. *Expected complications* (c x 0,15)	1389	1506	1622		1641	1755	1952	
Data of health facilities[3]								
e. *Number of deliveries performed by health centers*	2080	4212	5442		2986	3255	4250	
f. *Number of obstetrical references performed by health centers*	373	518	785		554	717	1004	
g. *Met need realized at hospital level* [4]	126	129	607		267	122	298	
h. N*umber of cesarean section in hospital*	76	84	337		136	49	108	
i. *Number of maternal deaths in health centers*	0	1	2		1	2	4	
j. N*umber of maternal deaths in district hospital*	0	0	1		3	2	4	
Indicators								
k. *Proportion of assisted deliveries (skilled birth attendance)* (e/c)	22.47%	41.95%	50.33%	0.000	27.30%	27.81%	32.66%	0.000
l. Proportion of obstetrical references performed by health centers	26.86	34.39	48.4	0.000	33.77%	40.84%	51.44%	0.000
m. P*roportion of complications treated* (g/d)	9.07%	8.56%	37.43%	0.000	16.27%	6.95%	15.27%	0.000
n. *Rate of cesarean section as proportion of all deliveries* (h/c)	0.82%	0.84%	3.12%	0.000	1.24%	0.42%	0.83%	0.000
o. Rate of cesarean section as proportion of all complicated deliveries (h/d*)*	5.47%	5.58%	20.78%	0.560	8.29%	2.79%	5.53%	0.000
p. *Maternal mortality rate at health center* (i/e)	0.00%	0.02%	0.04%	0.010	0.03%	0.06%	0.09%	0.610
q. *Maternal mortality rate in district hospital among referred women* (j/f)	0.00%	0.00%	0.13%	0.809	0.54%	0.28%	0.40%	0.910
r. Proportion of non relevant references [5]	***20.60%***	***19.40%***	***24.70%***	***0.319***	***19.90%***	***22.10%***	***34.90%***	***0.000***

The proportion of assisted deliveries at health centers of Rwamagana District has been highly increased during the period of three years from 22.47% in 2006 to 50.33% in 2008 and the differences is statistically highly significant (p =0.000 < 0.05). It is the same for proportion of treated complications and rate of cesarean section as proportion of all deliveries. The maternal mortality rate for mother at health centers had also increased and the difference is statistically

significant (p=0.010 < 0.05). Contrary, the proportion of transferred women for deliveries as not relevant references increased in certain manner with 20.60% in 2006, 19.40% in 2007 and 24.70% in 2008 but the difference is not statistically significant (difference of 4.1%, p=0.319 > 0.05). Thus the relevant transfers of women still the most frequent during the period of 2006 to 2008. The maternal mortality rate at Rwamagana district hospital had not statistically changed (almost 0%) during 2006 to 2008 (p=0.809> 0.05) and it was the same for rate of cesarean section as proportion of all complicated deliveries (p=0.560 > 0.05).

As in Rwamagana District, the proportion of assisted deliveries at health centers of Kamonyi District (Non PBF) has been slightly also increased during the period of three years 27.30% in 2006 to 32.66% in 2008 and the differences is statistically highly significant (difference of 15%, p =0.000 < 0.05). It is the same for proportion of treated complications. But there is a decrease of rate of cesarean section as proportion of all deliveries, rate of cesarean section as proportion of all complicated deliveries (p=0.000 < 0.05). The maternal mortality rate at health centers had increased but the difference is not statistically significant (p=0.610 > 0.05) and the MMR at Remera Rukoma district hospital had been decreased but not statistically significant during 2006 to 2008 (p=0.910 > 0.05). Thus, the proportion of maternal death stills the same for health centers as well as for the district hospital.

Considering relevant and non relevant transfers, the proportion of transferred women for deliveries as not relevant references increased from 19.90% in 2006 to 34.90% in 2008 at Kamonyi district (non PBF District); the difference is highly statistically significant (p=0.000 < 0.05). Thus, the relevant transfers of women for deliveries decrease in Kamonyi District (Non PBF) during the period of 2006 to 2008 and increased the non relevant transfers.

Comparing non-PBF and PBF districts for relevant and non relevant transfers sent by health centers to district hospitals, the difference is not significant in 2006 (p=0.856) and 2007 (p=0.591) but in 2008 the difference is highly significant (p=0.001) where 34.9% are non-relevant transfers in Kamonyi (non PBF) district and 24.7% in Rwamagana (PBF) district.

Box 2: Explanations for the table 2

[1] *Total population of health centers of Kamonyi and Rwamagana Districts)*

[2] *Crude birth rate defined as number of live birth by 1000 habitant/year, is 45/1000 (DHS, 2000)*

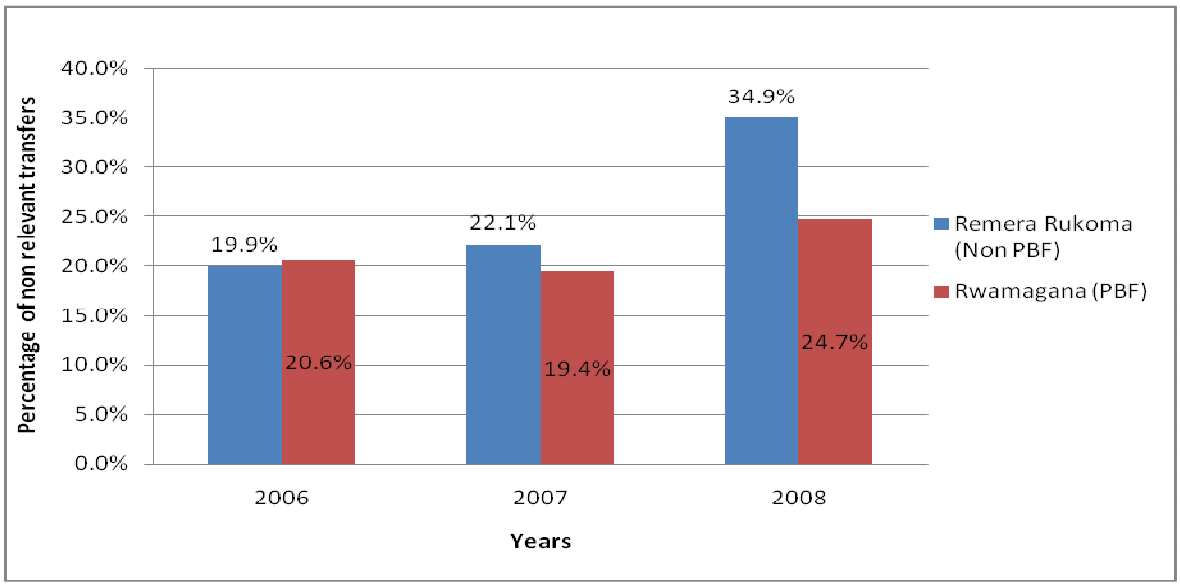
[3] *The data are representing the health centers of Rwamagana and Kamonyi districts in which we found in HMIS report at district levels and patients file for referred women.*

[4] *Referred women in whom we found at district levels with partogram or a transfer paper from HC*

[5] *Criteria of judgment for relevant references are described in the part of "Definition of concept and analytic strategies".*

[6] *The comparison of the three proportions by Chi-square. Every time the proportions are compared for the years 2006, 2007 and 2008. Maternal mortality rate is due to causes during labor to the exit of the patient at health facility (direct causes)*

Table 3: Relevant and non relevant transfers by year of admission in non PBF and PBF district



The graphic shows the proportion of non relevant transfers of women during three years. Comparing the two districts, we realize that in non-PBF District (Kamonyi), there are a lot of non relevant transfers (from 19.9% versus 20.6%) than in the PBF district (Rwamagana).

DISCUSSION OF THE RESULTS

In Rwanda, with the PBF intervention, a skilled birth attendance at health center is remunerated as the same of a referred one towards a district hospital. Thus, our study wants to explore the perverse effects of PBF in comparing one PBF-district (Rwamagana) and another non -PBF district (Kamonyi) during the period of 2006-2008 in the case of maternal health.

This was realized for the two districts assuming than there are some interventions which can influence the improvement of maternal health in Rwanda such as, performance based financing, sensitization of politico-administrative authorities, the district performance known as "IMIHIGO", the important role of CHWs, training of the personnel and formative supervision of health facilities, community health insurance and other health insurance, etc. We have considered that all those interventions present the similarities for both districts with exception of PBF intervention present at Rwamagana and absent at Kamonyi despite some differences related to the performance of the health providers and resources during the year 2006, 2007 and 2008.

According to the current health system of Rwanda, there are three level (health center, district hospital and National referral hospital) and in soon there will be five levels (Regional referral hospital, National referral hospitals, Provincial hospital, District Hospital and health centers); thus, when a patient needs care must use this health system structure from health centers to regional referral hospital (King Faycal Hospital). It is the same for the management in the maternal health care where when a health center is not able to manage a pregnant woman must refer to district hospital. It would be better if all women referred by health centers are found at district hospital but as we have seen all referred women were not found. Reasons of the absence of similarity may be: lack of the fulfillment of the condition fixed at the study of having a partogram or a reference paper, the poor keeping of the medical file by the record office, the fact that a woman may consult another health facility or never go to any health facility and deliver at home, etc. Because of some of them, only 39.2% of referred women for deliveries by health centers were found at district hospital level and all were included in the study.

Our study shows that at Rwamagana, the institutionalized deliveries were 22.47% in 2006 (39% according DHS 2005), 41.95% in 2007 and 50.33% in 2008. This last proportion was like the same than 52% from IDHS 2007-8 (Rwanda Ministry Of Health (MOH) [Rwanda], 2009). For Kamonyi district, institutionalized deliveries are still lower that the one of IDHS 2007-8(Rwanda Ministry Of Health (MOH) [Rwanda], 2009) because in 2006 the assisted deliveries were 27.30%, in 2007 it was 27.81% and 32.66% in 2008. What is more important is that there was a remarkable increase of institutional deliveries in a progressive manner due to the effort put in place by the Government of Rwanda through the policy of the MOH.

Our study shows an increase in number of skilled birth attendance (5.4% in Kamonyi and 27.8% in Rwamagana) in HC as well as the number of referred women for deliveries (17.6% in Kamonyi and 21.5% in Rwamagana) towards district hospitals during the period of 2006-2008. This has been shown by others studies in Rwanda (Meessen, J.-P. I. Kashala, & Musango, 2007)
Our study shows also that the proportion of complications managed at district levels (PBF and non PBF) during the period of 2006-2008 had increased for the two districts as well as the rate of cesarean sections. These show the same confirmation as the study of Louis Rusa et al where between 2001 and 2004; the PBF group saw an increase of institutional deliveries of close to 11

percentage points, while the non-PBF group increased by only 3.0 percentage points (Rusa, Schneidman, Fritsche, & Musango, 2009).

While the majority of transfers were relevant before the IP (initiative for performance) and did not change after the introduction of this IP (Soeters, Habineza, & Bob, 2006), the relevant transfers have increased for Rwamagana (PBF) but have decreased at Kamonyi (non PBF). This would mean that the PBF intervention does not lead to non relevant transfers of pregnant women for deliveries by health centers towards district hospitals but the increase of quality as shown by Rusa et al in 2001-2003 where for the quality, scores were considerably higher for effective management of deliveries and referral systems (Rusa, Schneidman, Fritsche, & Musango, 2009). The remaining proportion of non relevant transfers for deliveries from health centers towards district hospitals in 2008 with 24.47% at Rwamagana, a PBF district, may be probably due to the training or education of the health providers during their studies or due to the low availability of emergency obstetrical care or turner over of the personnel which is new in the services or to needs simply to be trained This was shown by a multicenter study in Rwanda, Benin, Jamaica and Equator showed that the knowledge and skills of health personnel to deal with obstetric emergencies were very weak and fall to 40-60% of standard norms (Abouzahr C &T, 2001). We have assumed that a non relevant transfer may have almost consequences for both family of the women and the health facilities. We can explain this in term of economy and time. For example, a family for which a women had been referred to district hospital being in 55 km, there a expenditure s like money for transport, buying food and drinks, preparing all the necessary for a pregnant women and even for buying medicines. For the time spend at district hospital as well as the psycho-social influence of a women who has recently given birth would receive cannot be measured. The loss to the health facilities (health center or a district referral hospital) may be thought in term of money (for the fuel and maintenance of the ambulance), stress or overwork to the health providers especially for those of the district hospital. For health providers in healthy centers they can be discredited either by his colleagues or by women of the family because when a health provider refers someone must explain to him the reason of this reference and when that reason is not true for one or several time, it may be a doubt on the competence of those health providers.

Like some authors believe that the bad design of indicators can lead to perverse effect and negative effect on the quality of care (Werner R.M., 2007), we didn't observe them in our study. Any adverse potential effect had been observed due to the intervention of PBF, which may have been seen in Rwamagana district,; no increase of non relevant transfers of women for deliveries at district level during the three years (2006-2008) as seen above. Contrary, we have seen the increase of those non relevant transfers in the non-PBF district (Kamonyi); thus the PBF had brought an improvement in the management of the emergency of maternal cases.

This may answers the questions raised by some observes as Bruno Meessen and colleagues wrote "*Some observers have raised the concern that buying outputs may induce a shift in staff values or expectations (e.g. create the perverse perception that any behavior deserves a specific payment). To avoid this problem, the bonus contracts in Kabutare clearly refer to medical ethics and describe possible sanctions that would be imposed in case of fault*" (Meessen, Musango, J.-pierre I. Kashala, & Lemlin, 2006).

In the case of maternal health, because the normal delivery performed at health center is remunerated at the same amount as the referred women at district level for delivery, we would expect to have as negative impact a great number of "non relevant transfers" in the PBF area than in the non PBF area. This greater number of "non relevant transfers" would have been due to:

- **Lack of competent personnel:** the health center may refer because their personnel are not able to manage a normal delivery.
- **Laziness of the health providers** at health center that would refer women on labor for delivery to district hospital while it was a simple normal delivery.
- **Fear to have problems** related to the delivery (like maternal deaths, fetal distress, postpartum hemorrhage, etc) and health provider prefer to send a woman at district hospital. We can say that because of that fear, the health care provider in health center would prefer to get rid of women on labor for delivery in order to be free.
- **Insufficient qualified health providers** that in some cases they may not be a qualified person to do a night duty or even, if he/she is present can be overworked (because of that health centers may refer as well as there is a remuneration to a referred women for delivery).

- **Insufficient or absence of equipment** (or even equipment in bad condition) which may influence the health provider in health centers to refer to district hospital.
- **The issue of infrastructure in a health center** (health center not far from the hospital, health center without appropriate infrastructures, transportation easily available) may also bring their health providers to refer women towards district hospitals.

Briefly, in our study, these reasons did not influence the transfers of women for maternal reasons which would have induced an increase of "non relevant transfers" in the PBF area but at the contrarily we have seen a significant increase in the non-PBF area.

Conclusion and recommandations

By the end of this study, we conclude that there has been increase of institutional deliveries and references of pregnant women at health centers to districts hospitals in both PBF (Rwamagana) and non PBF (Kamonyi) districts during the years 2006-2008.

For the reasons of references of pregnant women from health centers to districts hospitals, there has been a significantly increases of the comparability reasons between health centers and district hospitals in both PBF and non PBF districts. Formative supervisions by district hospitals, training of health providers, increases in qualified personnel put in place in the health system of Rwanda may have been contributing to this.

Results show that there are no potential risks especially non-relevant transfers due to performance based financing intervention in the district which has used this approach from 2006 to 2008 but in the non-PBF district, there has been a significant increase of non relevant transfers of women for maternal reasons during that period.

The reinforcement of PBF by stakeholders by continuous monitoring and improvement of the management of pregnant women by health facilities is recommended. The research of this kind at national level is highly recommended.

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