Performance-Based Financing for Health in the Republic of Congo

Impact Evaluation Concept Note

February 8, 2014

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Introduction and background

Performance-based financing

Scaling-up of performance-based financing (PBF) schemes across sub-Saharan Africa (SSA) has developed rapidly over the past few years. PBF schemes have attained national coverage in Rwanda, Burundi, and Sierra Leone, and are being piloted in different sub-Saharan countries, among them: Central African Republic, Zimbabwe, Zambia, the Democratic Republic of Congo (DRC), Benin, Cameroon, Chad, and Malawi.

Initial evidence from PBF pilots in low-income countries suggests that linking payment mechanisms to defined outcomes can lead to increased service coverage and improved service quality for maternal and child health services. In Rwanda, results from two independent evaluations showed a positive impact of PBF on utilization for institutional deliveries, growth monitoring consultations, and increased levels of perceived and evaluated quality of care (Basinga et al., 2011; Meessen et al., 2007; Meessen et al., 2006). In South Kivu in the DRC, providing performance-based subsidies resulted in lower direct payments to health facilities for patients, who received comparable or higher quality services than patients receiving care in control facilities. This disparity occurred despite the fact that districts receiving performance-based subsidies received less external foreign assistance than control districts (Soeters et al., 2011).

A recent review points out that despite the promising results, more evidence from rigorous experimental or quasi-experimental evaluations is needed (Gorter & Meessen, 2013; Jahn et al., 2013). They also emphasize the need for qualitative methods, in order to understand the overall system effects and the motivation and health seeking behaviour of health care providers and consumers (Witter et al., 2012; Freitheim et al., 2012).

In several countries, health programs are currently being developed that combine supply-side PBF with demand-side interventions that aim at improving access to essential health services. These include linking PBF with conditional cash transfers (Zimbabwe, the Gambia and Nigeria), unconditional cash transfers (Cameroon) and community-based health insurance and pro-poor community targeting (Burkina Faso). Only a few studies have looked at the equity effects of PBF interventions. Only one study in Cambodia shows that the contracted districts outperformed the control districts in delivering MNCH services to the poor (Schwartz & Bhushan, 2004). The potential impact of PBF on equity needs to be further demonstrated.

Situation of the health sector in the Republic of Congo

The Republic of Congo (ROC) is growing and urbanizing. ROC is a lower middle income country with vast oil revenues and a small population, estimated at 4.2 million in 2012. ROC has one of the fastest economic growth rates in Sub-Saharan Africa (average 5.7 percent over 2007-2012) and has the potential to become economy middle-income country over the next decade. Sixty two percent of the population lives in urban areas half of which are living in two main urban centers, Brazzaville and Pointe Noire. Nearly forty percent of Congo's population is under 15, and the population overall is growing at a rate of 3 percent per year. If sustained, this growth rate will lead to a doubling of the population in 25 years.

In the past seven years, there has been uneven progress toward the MDGs. For MDG 4, reducing child mortality, under-five mortality rate was 68 per 1000 (target is 35 per 1000). Along the same lines, the likelihood that extreme poverty and hunger will be eradicated (MDG 1), that maternal health indicators will be improved (MDG 5), that HIV/AIDS will be halted and reversed and universal access to treatment will be achieved (MDG 6) and that half the number of people with access to safe drinking water and sanitation (MDG 7) targets will be reached by 2015 is low.

The availability and allocation of resources in the health sector is a major concern in ROC. Whereas ROC ranks among the countries with the highest per capita income in Sub-Saharan Africa (rank of 35 out of 45 countries), its total health expenditure (THE) per capita, at 2.5% of GDP, is the second lowest in the region. Public health expenditure as a share of THE is the 6th lowest regionally and the country's reliance on out-of-pocket health spending out of total health financing, at 64%, is among the highest. Two-thirds of the government's health budget is allocated to the teaching hospital (CHU) and five general hospitals, which provide secondary or tertiary curative care to limited segments of the population, while about one-third goes to preventive and primary care which should benefit the entire population. These shares are not atypical for a Sub-Saharan African country and they signal a major misallocation of scarce public resources, since the main policy aim should be to reduce the overall burden of disease of the entire population. Further, this skewed allocation results in inadequate financial protection for low income groups against high-cost health treatments, because the rural poor have limited access to hospital care.

Table 1: Income and health spending indicators for ROC ranked among all countries in Sub-Saharan Africa

Indicator	Rank (1=lowest; 45=highest	Value
GDP per capita, PPP (constant 2005 international $)	35	3,850
Health expenditure, total (% of GDP)	2	2.5%
Health expenditure, public (% of GDP)	6	1.6%
Out of pocket expenditure (% of total health expenditure)	39	64.0%

Over 50% of all financing of government health care providers comes from user fees (NHA 2010). User fees are imposed on curative care in government health facilities as well as to essential preventive services such as growth monitoring for children under five years of age, institutional deliveries and ante natal and post natal services. In addition, the government has adopted a cost-recovery policy for medicines in its health facilities, except for a few selected generic medicines to treat malaria and other diseases, where government distributes them for free and no cost recovery is allowed. Whereas in the urban areas poverty is widespread (around 40% of the population lives on less than $1 per day), in the rural areas this is even greater (around 70% of the population lives on less than $1 a day).

Utilization rates for key MCH services remain low both in urban and rural areas despite the fact that 70% of population lives in the urban area and hence should have better access to health services. This low level of access could be attributed in part to poor quality of health services, and high user fees. When closely examining the quality issues, one notes the following obstacles to quality health services: (i) the performance of health workers (absenteeism, quality of care, interpersonal skills) is weak, (ii) health facilities have limited funding for ensuring availability of drugs and supplies; (iii) the type of services available at the health facility level is limited; and (iv) the availability of the service in terms of convenience (operating hours proximity), and hotel services (such as meals, gardening, laundry) are inadequate, further reducing the likelihood of care seeking at these facilities.

Health outcomes are poor throughout the country and there exist large inequalities within the country between urban and rural areas and different socio-economic groups. While there is a modest difference between urban and rural child mortality rates, there is a wide gap between the richest income quintile and the rest of the population (Table 2).

Table 2: Child and infant mortality rates, Republic of Congo, 2011-2012

	Neonatal mortality (NN)	Infant mortality (1q0)	Under 5 mortality (5q0)
Residence			

Urban	26	45	77
Rural	21	51	88
The poorest	22	52	89
Second	29	55	98
Middle	24	42	81
Fourth	26	46	74
The richest	19	36	54

Source: Ministère de l'Économie, des Finances, du Plan, du Portefeuille Public et de l'Intégration et Centre National de la Statistique et des Études Économiques (CNSEE) (2013) *Enquête Démographique et de Santé du Congo (EDSC-II) 2011-2012*. Brazzaville.

Current Safety Nets programs in the Republic of Congo

Given the high levels of poverty, the uneven distribution of the benefits of growth, and lagging social indicators in ROC, investments such as social safety net programs that are targeted to the poorest and most vulnerable can play an important role in speeding up the momentum in poverty reduction. Some safety net programs exist aimed towards indigents and specific vulnerable groups such as the elderly, handicapped or orphans, and are managed by the Ministry of Social Affairs, Humanitarian Action and Solidarity (MASAHS) with a very small budget (only 0.51% of the 2012 revised national budget, which represents 0.15-0.2% of GDP). Moreover, the programs are uncoordinated and very small (in terms of number of beneficiaries); they provide irregular and unpredictable social transfers; and do not have clear or transparent documentation that describe how eligibility criteria are applied and how benefit amounts are defined. The main programs include (a) provision of an indigence card that gives entitlement to free health care, (b) ad-hoc and on-demand financial assistance to attenuate poverty or to buy medicines, (c) social workers case management activities for the resolution of social problems such as the abandonment of children, denial of pregnancy and parental irresponsibility, (d) school kits to orphans and children from vulnerable families, and (e) scholarships to the most vulnerable students for higher education. Safety net programs in ROC are uncoordinated and very small (in terms of number of beneficiaries); they provide irregular and unpredictable social transfers; and do not have clear or transparent documentation that describe how eligibility criteria are applied and how benefit amounts are defined.

Overview of Republic of Congo Health Sector Strengthening Project II and proposed Performance-based Financing Intervention

Previous experience with PBF in Republic of Congo (Pre-pilot)

A PBF pre-pilot has been implemented in three departments of ROC (Niari, Pool and Plateaux) since January 2012. The pre-pilot is financed by the current Bank health project (PDSS). Results from the first year of the pre-pilot show substantial increases in service delivery during the first

12 months for curative consultations, assisted deliveries and tetanus toxoid (all are well over 10% increase between 2011 and 2012). In addition, quality of care has increased substantially in health facilities participating in the pre-pilot.

PBF pilot in Republic of Congo - Congo Health Sector Strengthening Project II

The development objective of the new World Bank operation is to increase the utilization and quality of maternal and child health services in targeted areas of the Republic of Congo (ROC). The project will be implemented initially in 7 out of the 13 Departments of ROC, including Brazzaville, Pointe Noire, Bouenza, Cuvette, in addition to the three included in the pre-pilot, Niari, Pool and Plateaux. The project will extend coverage of PBF to an additional four Departments. Building on the ongoing experience with PBF, subsidies will be paid to primary care facilities and first-level referral hospitals based on the: (i) number of health services delivered to the targeted population and (ii) the technical quality of those services. Facility payments will be made after the volume of services and the quality of care have been verified and certified by an independent contract management and verification agency (CMV). The direct beneficiaries of the project are women of reproductive age and their young children, who will have an improved access to reproductive and child health services. The indirect beneficiaries include the estimated 3,774,234 million inhabitants in the seven departments participating in the project's PBF component, or close to 90% of the country's population.

Many actors view PBF as a potential instrument to improve access to quality health services, but have questioned if with only a supply-side PBF intervention there would be equitable sharing of the benefits of quality services and if the poor would actually benefit from the intervention. It was suggested that targeted subsidization for the poor for improved access to health services could be coupled with PBF to ensure greater equity in benefitting from the operation.

All seven departments included in the project will be included in the impact evaluation. Although three departments were included in the pre-pilot phase, given the limited exposure time during the pre-pilot and the fact that the PBF model in the new operation will be substantially different than that of the pre-pilot (both in terms of the supply-side contracting and payment mechanisms and the demand-side interventions such as home visits and targeting of the poor) these three departments will be included in the impact evaluation (Table 3).

Table 3: Regions and districts included in the PDSS II Zone

Department	CSS	Number of primary care facilities
Bouenza	Loutété	4
	Madingou	6
	Mouyondzi	6
	Nkayi-Loudima	13
Total Bouenza		**29**
Brazzaville	Bacongo	10
	Madibou	14
	Makélékélé	18
	Mfilou-Ngamaba	18
	Moungali	15
	Ouenzé	17
	Poto-Poto	13
	Talangaï	33
Total Brazzaville		**138**
Cuvette	Alima	10
	Mossaka-Loukoléla	1
	Owando	5
Total Cuvette		**16**
Niari	Dolisie	24
	Kibangou	13
	Mossendjo	13
Total Niari		**50**
Plateaux	Abala	8
	Djambala-Lekana	15
	Gamboma	15
Total Plateaux		**38**
Pointe-Noire	Loandjili	13
	Lumumba	21
	Mongo Mpoukou	12
	Mvoumvou	10
	N'goyo	12
	Tié-Tié	17
Total Pointe-Noire		**85**
Pool	Goma tse tse	12
	Igne ngabe mayama	20
	Kindamba-Vinza	10
	Kinkala boko	21
	Mindouli	18
Total Pool		**81**
Total		**437**

Note: A national health facility mapping exercise will be completed in September 2013 which will provide complete and up-to-date information on the number of functional health facilities in the project and impact evaluation areas. The table will be updated once this activity is completed.

Map 1: Administrative Departments of Republic of Congo

Overview of Republic of Congo LISUNGI Social Safety Net Project

The main objective of the LISUNGI project will be to "establish the key building blocks of a national safety net system in the country and implement a pilot cash transfer program targeted to the poorest groups of the population". Component 1 of the project will cover the set-up of basic elements of safety nets to support a long term sustainable and effective system in the country and enhance local capacities to support local program implementation. Activities financed by this component will include (i) the development of a management information system; (ii) the set-up of a Unified Registry (UR) of potential beneficiaries of safety nets programs (including for health); (iii) the set-up of an Information Education and Communication Campaign (IEC); (iv) the set-up of monitoring and evaluation procedures; and (v) technical assistance to evaluate and finance studies to address the needs of specific population such as the disabled and the indigenous population. More specifically regarding the MIS, the project goal is to develop and implement a modular computer system that will be capable of producing reports regarding potential beneficiaries, beneficiaries, program activities transfers; support the financial management of projects produce the necessary information for monitoring and evaluation; etc.

Component 2 will support the development and implementation of phase one of a cash transfer program that will become the cornerstone of the social safety net system in the country. The cash transfer programs intends to increase the consumption of the poorest households by the provision of direct transfer to poor households with children and to poor elderly. Cash transfers will be

linked to and conditional on household health and education-related behavior. The primary beneficiaries of Component 2 of the project are:

a) 5,000 poor or vulnerable households, with children under age of 14 years old, using national criteria for means testing to identify eligible households in the target area, and
b) 1,000 poor or vulnerable Elderly aged 60 years-old or above.

The project will be implemented only in the peri-urban or urban areas of Pointe-Noire, Brazzaville and Cuvette who need assistance to meet ends need in terms of food consumption. Partition of the number of beneficiaries in each of the three regions will be based on quotas determined by poverty rates and population of the geographical zones.

The goals of this component are twofold:

a) For the poor or vulnerable households with children aged 0-14 year olds the project aims to support improvements on health outcomes for the youngest and to support school progression through the primary education cycle; and
b) For the poor or vulnerable Elderly aged 60+ the project aims to improve consumption of this population and to mitigate current poverty.

The method for selection of beneficiaries will be Community-Based Targeting, with an economic proxy for verification through asset assessment. Local committees will be set up in each *Circonscriptions d'Action Sociale (CAS)* local with representatives of the district, communes and neighborhood/villages.

Impact evaluation research questions

Objectives of the Impact Evaluation

In collaboration with the Ministry of Health and the Ministry of Social Affairs, the World Bank team has developed a design to assess the impact of the abovementioned PBF intervention in combination with certain elements of the LISUNGI intervention.

The overall objective of the impact evaluation is to scientifically evaluate the impact of the PBF intervention on maternal and child health outcomes such as quality of care and health service utilization. The impact evaluation has a specific focus on the role of PBF, in combination with various demand-side interventions such as poverty targeting and registration systems for improved financial access and household visits for improved health behavior, in improving equity in health outcomes across socio-economic groups. An identification strategy will be designed that to allow the impact evaluation to measure the causal effects and cost-effectiveness of the different packages.

Research questions for PBF-IE in Republic of Congo

The overall research question of this impact evaluation is " Does performance-based financing improve outcomes related to the utilization and quality of maternal and child health services in Republic of Congo?" The primary research questions for the impact evaluation will be grouped into two thematic groups:

Improved financial access through integrating PBF and social safety nets

- Does PBF improve financial access to and utilization of quality health services for vulnerable populations without demand-side interventions that aim to improve financial access for the poor?
- Does the combination of PBF and pro-poor targeting mechanisms improve financial access to and utilization of quality health services for vulnerable populations more than PBF alone?

Behavior change through community-based PBF services

- Does the introduction of the PBF indicator "*household visit according to protocol*" lead to improved preventative health behavior within targeted households, such as improved water, sanitation and hygiene, and use of bednets?
- Does the introduction of the PBF indicator "*household visit according to protocol*" lead to improved maternal and child health seeking-behavior, such as use of family planning, reproductive health education for adolescent girls; antenatal and delivery services, vaccination status for pregnant women and babies?
- Does the introduction of the PBF indicator "*household visit according to protocol*" lead to improved population knowledge related to maternal and child health, hygiene and sanitation?

Finally, what is the combined effect of strengthening the supply-side through PBF, improving financial access through targeting the poor, and improving health behaviors through counseling and coaching during household visits by health care professionals?

Additional research questions are as follows:

1. What is the effect of PBF on contraceptive prevalence rate, proportion of births assisted by skilled personnel, proportion of women attending post-natal consultations?
2. What is the effect of PBF on quality of OPD, antenatal, delivery, postnatal, neonatal, HIV, TB and inpatient care health care services at primary and secondary care facilities?
3. What is the effect of PBF on health service coverage for children such as immunizations and growth monitoring?

4. What is the effect of PBF on nutrition outcomes such as iron-folic acid supplementation during pregnancy, birth weights at the time of delivery, early breast-feeding initiation, and acute malnutrition?
5. What is the effect of PBF on health care providers' behaviors, motivation and health service delivery process?
6. What are the factors leading to the observed results?
7. The operation will include a community mobilization component that will provide capacity building activities for local civil society organizations to foster the creation of local contract management and verification agents. The IE will also investigate through mixed methods the efficiency and effectiveness of this approach.

Interventions that will be introduced to answer the IE research questions

To answer the abovementioned research questions, the intervention and its impact evaluation will introduce different packages of PBF linked or not to improving access for the poor:

- ***Intervention 1:*** *Performance-based financing:* PBF performance agreements concluded between the MOH and the health center will define the package of basic services to be provided, and the indicators and targets to be reached in delivering these services. The results achieved against these targets will then be assessed by external reviewers through monthly quantity verification (by the contract management and verification agent), and once per quarter quality verification by a different entity (the regulator). Based on these verified results, each facility under a PBF contract will receive payments in partial reimbursement for the services delivered. The payments will be based on unit prices developed under the PBF model, based on a number of factors designed to achieve the desired results, including basic cost of the inputs required (and not financed elsewhere) for services to be rendered, adjusted for quality of the service. As part of the supply-side PBF intervention in the Republic of Congo, this intervention group will allow for up to 20% of total services delivered at each health facility to be provided free of charge to poor and vulnerable households through a post-identification method at the point of service delivery (*implicit* or *passive* targeting), meaning that identification will be at the discretion of health care providers when patients arrive at health facilities for care. PBF unit prices will be higher for these services provided free of charge than for services where user fees are charged.

- ***Intervention 2:*** *Performance-based financing + community-based targeting (CBT) and subsidization of the poor (safety net):* Intervention 2 will use the institutional framework of Intervention 1 (Supply-side PBF) but will also include implementation of the CBT method to identify households through pre-identification at the community-level (*explicit* or *active* targeting) that meet enrollment criteria for the safety net program and register poor households that meet inclusion criteria for the safety net program. Households that are identified and enrolled in the program will receive free health care cards ("carte

d'indigence") and will be guaranteed access to a pre-defined package of health services free of charge at health facilities under PBF. The community-based targeting process will be implemented just prior to the implementation of the supply-side PBF intervention in order to ensure that both demand and supply-side interventions begin at the same point in time. Specifically:

a) PBF contract management and verification agents will work with district health teams, health facility management committees (COSA) and Government Social Protection agents to identify households that meet inclusion criteria for the CBT safety net program. Basic information will be collected on each household in each community in the health facility catchment area, complied and analyzed using the LISUNGI criteria for poverty classification (10-20% poorest households).
b) Patients who meet the enrollment criteria will be enrolled into the program, receive the "carte d'indigence" and benefit from the free services as defined by the PBF intervention, after verification that the households meets the criteria through follow-up visits to the households by SP agents.
c) As in intervention 1, the PBF price schedule for services provided free of charge to safety net enrollees will be higher than for services where user fees are charged, meaning that health facilities will receive higher PBF payments for these services to cover the potential lost due to user fee waivers for the poor.
d) Subsidization of health services for the poor through post-identification at the point of service will still be an option for health care providers in this intervention group.

- ***Intervention 3:*** *Performance-based financing +household visits according to protocol:* Intervention 3 will use the intervention framework of Intervention 1 (Supply-side PBF) but will also include implementation of a community-based PBF indicator titled "household visit according to protocol". The objective of this service is to facilitate positive preventative and health-seeking behavior change whereby health workers and other community workers systematically visit households in the catchment areas of health facilities and cover a larger number of behavior change issues. During the first household visit the baseline situation is being reviewed. A record is made in a standard register of the baseline situation and the team then agrees with the household on the actions to be taken by the household members, health center staff and local administrative authorities. A second visit may place to review the actions and recommendations. If the review is not satisfactory a third visit may be proposed. Health facilities will be paid for each household visit conducted, with a pre-determined maximum number of visits per calendar year (to be determined at a later date).

- ***Intervention 4:*** *Performance-based financing + community-based targeting (CBT) and subsidization of the poor (safety net) + household visits according to protocol:* Intervention 4 will use the intervention framework of Intervention 1 (Supply-side PBF) but will also include

implementation of both enrollment of the poor into a safety net program (Intervention 2) and the PBF "household visit according to protocol" (Intervention 3).

- ***Control:*** The performance-based financing intervention introduced in the Republic of Congo that includes multiple components such as additional financial resources, payment linked to achieved results, and enhanced monitoring, supervision and verification. In order to control for the PBF attribute of providing additional financial resources at the health service delivery level, Control (C) facilities will receive a *fixed per capita budgetary supplement that matches the per capita budgetary allocation for T1 facilities*, based on the population of the health facility catchment area. However, the additional financial resources provided will be lump-sum and not be linked to performance. C1 facilities will not receive enhanced supervision and monitoring and managerial autonomy over the budgetary supplement received as in the PBF groups. Control facility managers will not have the autonomy to hire/ fire staff or financial autonomy. Introducing a control group that allows for budget neutrality between groups will allow for the impact evaluation and Government of the Republic of Congo to generate scientific evidence on the effect of the PBF intervention and linking payments to results on outcomes of interest *conditional* on providing additional resources to health facilities.

Note that the conditional cash transfer component will not be assessed through the HRITF impact evaluation due to the limited geographical coverage and number of beneficiaries included in the intervention.

Conceptual framework of change theory

There are key factors that impact overall service quality and service coverage, such as user fees, perceived quality of services and availability of supplies. Many of these factors are interconnected, for example: clean facility and perceived quality of care. These factors are identified on the facility/provider or 'supply' side, as well as the consumer or 'demand' side. The conceptual framework of change theory suggests that targeting these key factors in our intervention will lead to potential changes, which in turn, support the overall improved quality and coverage of maternal and child health services. Figure 1 identifies the list of key factors that are targeted and describes the expected PBF triggered changes that can improve MCH service coverage. We have hypothesized that:

1. Purchasing priority quality-adjusted service outputs can incentivize facility managers and health workers to expand the delivery of priority and high quality MCH service outputs in a client-focused manner and to increase demand for health services;
2. Independent monitoring can also encourage managers to work for results while managerial autonomy and supervisory support can enable them to respond to these incentives;

3. Performance bonuses to health workers can incentivize health workers to adopt a client-friendly attitude, reduce absenteeism and reduce informal charges to patients.

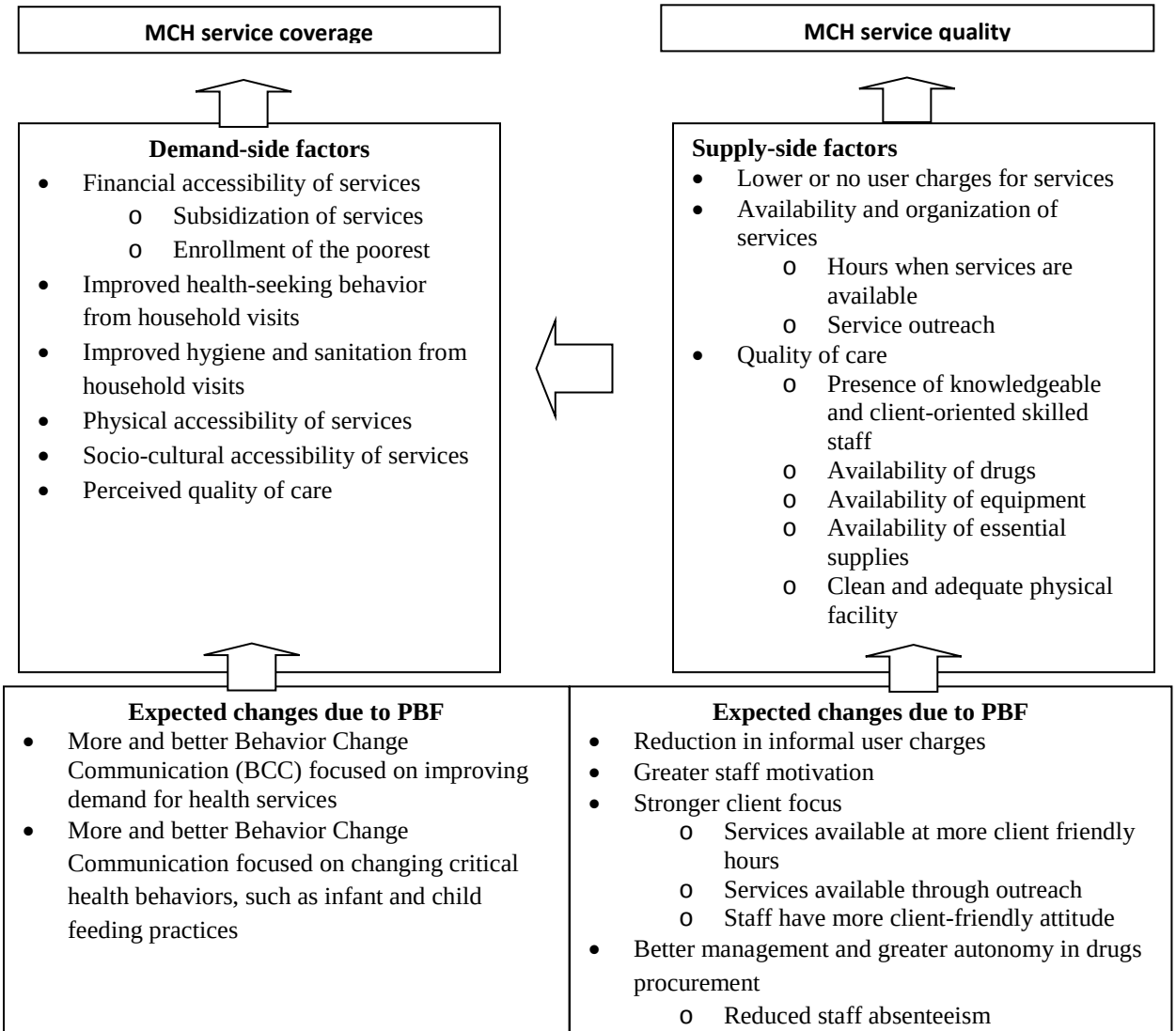
In addition to the abovementioned expected outcomes from the traditional supply-side PBF intervention, by introducing additional mechanisms within the PBF framework that aim to improve health service coverage across all socio-economic groups, including the most vulnerable, we hypothesize that:

4. Health workers and communities will be incentivized to ensure access to essential services for the poor;

We expect that this will, in turn, result in important changes at the health facility level such as:

1. Lower user charges, through reduced informal charges to patients and targeted subsidies for the poorest,
2. More accessible health services, through reduction of financial barriers,
3. Better facility functioning and improved quality of care,
4. An increased focus on generating demand for health services, and
5. The distribution of health benefits from the PBF intervention more equitable across different socio-economic groups.

Figure 1: How does the Congo PBF intervention affect health service coverage and quality



Identification strategy and study design

Study design

The effect identification will be based on a basic mean outcome comparison of treatment and control areas. To evaluate the effect of the PBF package, we will explore the random variation in timing generated by the phased-in rollout of the program across districts. The two additional interventions will be randomly rolled out within districts covered by the PBF, and can thus directly be compared to PBF only as well as to a pure control group. The study will adopt an experimental design. Randomized assignment will occur at two levels:

a. In the remaining four departments where the PBF pre-pilot has not been implemented the 20 health districts will be randomized into PBF (50%) and control districts (50%) during the first two years, followed by rolling out PBF in the remaining control districts at the end of the second year;
b. Two demand-side interventions will be introduced in the 21 districts implementing PBF (11 in the three Departments where the PBF pre-pilot was conducted and 10 out of the 20 districts in the four new Departments) through randomized assignment at the primary care facility-level (approximately 150 primary care facilities in the 21 districts) within PBF districts to test the effects of these interventions on outcomes of interest.

We will also have a mixed-method explanatory design: quantitative data collection will precede and inform qualitative data collection. In this study, the quantitative component will dominate the qualitative one, because most utilization and quality indicators to be monitored over time can more easily be captured quantitatively than qualitatively. Quantitative data will be collected at baseline and endline surveys. Qualitative data will be collected only for the endline survey.

Identification Strategy

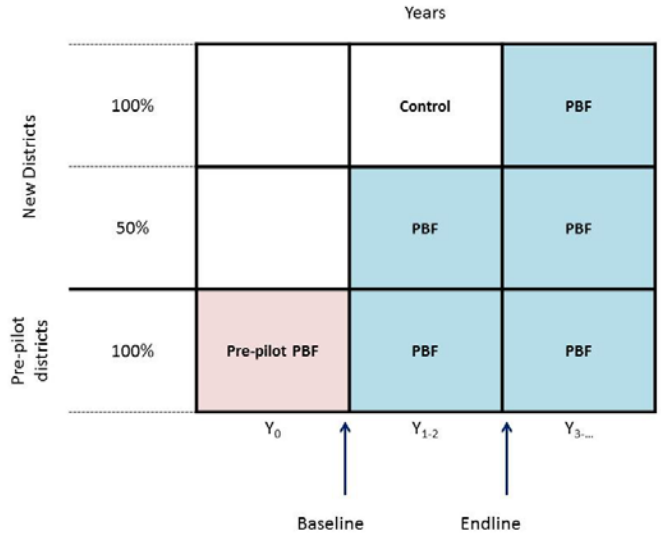
The study will be a blocked-by-department cluster randomized trial (CRT) having a pre-post and cross-phase comparison design. This process of random allocation seeks to ensure that the different study groups are comparable in terms of observed and unobserved characteristics that could affect treatment outcomes so that average differences in outcome can be causally attributed.

Randomization of PBF at the health district level

As a first step, the 20 health districts (CSS) in the four departments not included in the pre-pilot will be randomized into PBF (“treatment”) and non-PBF (“control”) districts through a step-wedge roll out, blocked at the Department al level (Figure 3). The benefits of step-wedge models are numerous. The randomized stepped wedge roll-out of the program should remove selection bias concern, limit contamination between communities and, at the same time, guarantees that all districts benefit from the intervention after two years. The 11 districts in the 3 departments included in the pre-pilot will all be include in the PBF treatment group (i.e. no control districts)

In the first two years of the project, PBF will be implemented in all health facilities in the 21 health districts in the treatment group while no intervention will occur in the control districts apart from the provision of additional subsides (see description of control group). In year three of the project, PBF will be rolled out to the remaining 10 health districts so that after two years all health facilities in the seven departments are included in the PBF intervention. The impact evaluation will explore the variations in exposure to different treatments during the first two years of the project before an adopted model of PBF is scaled-up to all facilities in the seven departments. The 10 districts and 89 health facilities in the five Departments not include in the project will also be surveyed as the baseline and endline surveys will cover the entire country.

Figure 2: Step-wedge rollout of PBF in the four departments



The intervention (PBF) and control districts selected during the public randomization ceremony on October 24th, 2013 are as follows:

Treatment (PBF)		**Control**	
Departement	**District (CSS)**	**eépartement**	**District (CSS)**
Pointe Noire	Tié-tié et N'Goyo	Pointe Noire	Lumumba
Pointe Noire	Mvoumvou*	Pointe Noire	Loandjili-Mongo Mpoukou
Brazzaville	Makélékélé-Madibou*	Brazzaville	Moungali*
Brazzaville	Mfilou	Brazzaville	Ouénzé
Brazzaville	Bacongo*	Brazzaville	Talangaï*
Bouenza	Loutété	Brazzaville	Poto-Poto
Bouenza	Nkayi-Loudima	Bouenza	Madingou

Pool	Kindamba	Bouenza	Mouyondzi
Cuvette	Mossaka-Loukoléla*	Pool	Mindouli
Cuvette	Owando*	Cuvette	Alima*

* Intervention zone for LISUNGI

In addition, the nine districts (CSS) which were included in the PDSS I pilot that will also be PBF intervention group for the impact evaluation are as follows:

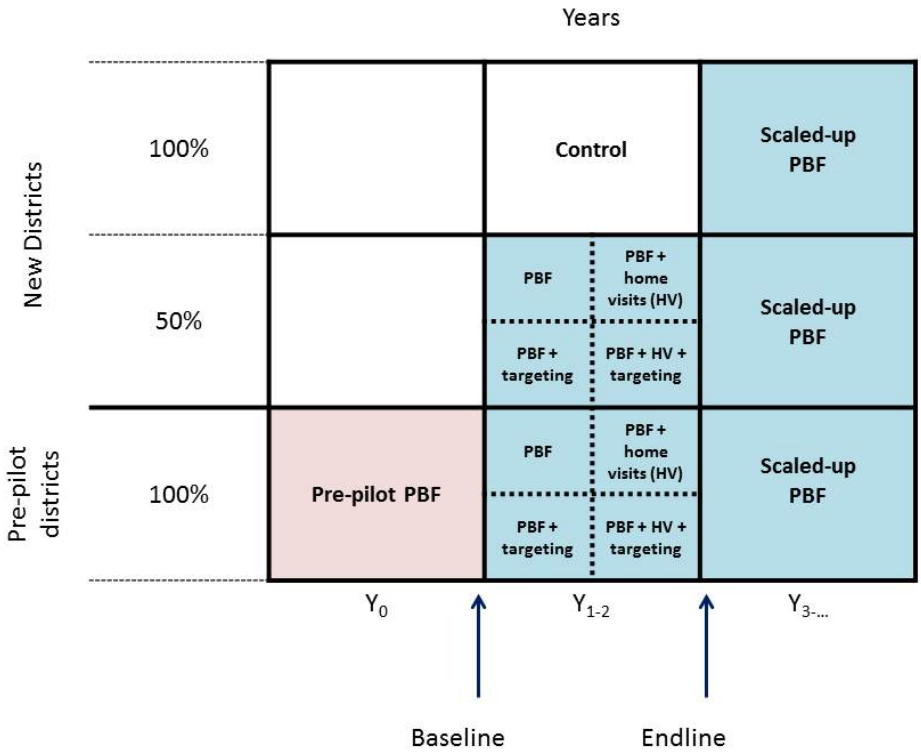
Department	District (CSS)
Nairi	Dolisie
	Kibangou
	Mossendjo
Plateau	Djambala-Lékana
	Gamboma
	Abala
Pool	Kinkala-Boko
	Goma-Tsé-Tsé
	Ignié-Ngabé

Randomization of demand-side interventions (home visits and safety net program) at the health facility level

At the same time that health districts are randomized into the different stages of the phased rollout, **individual health facilities** in the seven PBF departments will be randomized to one of 4 study groups (T1, T2, T3 and T4) that include different combinations of supply-side PBF and demand-side interventions (Figure 4). Rollout of the demand-side interventions will occur simultaneously with the roll-out of PBF so that the demand-side interventions will take place only in districts where PBF is being implemented during the first two years, with no intervention occurring in the control health districts and facilities.

There are approximately 150 health facilities in the areas covered by PBF in the first two years (21 districts). To maximize statistical power, one quarter of all targeted facilities will be assigned to each treatment as the program rolls out, for a total of 37 facilities in each treatment arm during the first two years. A sampling strategy will be defined that will ensure that the four impact evaluation intervention and control arms have similar service delivery characteristics (geographical access, quality and availability of services, etc.).

Figure 4: Randomized assignment of demand-side interventions in the seven departments



All district hospitals in the seven intervention departments will be included in the PBF plus targeting of the poor (i.e., intervention 2) arm. This is because district hospitals play a critical role in supervising and acting as source of referral services for all facilities in the district (CSS). Due to challenges encountered in improving hospital performance, various options to strengthen hospital management will be explored. Such options could include, in addition to PBF, contracting with individual managers or firms, or recruitment of hospital management consultants. District hospitals will supervise and support different packages groups differently based on the group they are assigned to. We will have a before-after design at the level of district hospital.

Based on the different interventions which will be implemented, five study groups will be introduced to answer the impact evaluation research questions (Figure 5).

Figure 5: Identification strategy for the PBF and demand-side interventions – Random assignment at the health facility level in PBF districts during the first two years

T1: PBF with post-identification (point of service) exemptions for the poor	***T2: PBF + pro-poor targeting through use of pre-identification community-based targeting***

37 health facilities	37 health facilities
T3: PBF + household visits according to protocol 37 health facilities	***T4: PBF + PBF + pro-poor targeting through use of pre-identification community-based targeting + household visits according to protocol*** 37 health facilities
Control: fixed per capita budgetary supplement that matches the per capita budgetary allocation for T1 facilities 50 health facilities	

The impact evaluation team is aware that health facility catchment areas are poorly defined in ROC, and that individuals living in the catchment area of a facility assigned to a given study group (e.g. T1) may visit a health facility assigned to a different group (e.g. T2). The low density of health facilities in the predominantly rural study districts lowers these risks. Nonetheless, where this occurs it could bias our estimates of impact. The impact evaluation will therefore seek to (a) minimize, and (b) measure contamination and account for how this may have affected the estimates of impact. To minimize contamination, GIS mapping will be conducted before the baseline survey to define realistic catchment areas for health facilities. This GIS mapping will help to define 'true' catchment areas by taking into account physical features (like terrain or water bodies) and roads that influence travel time and thereby potentially affect health facility choice. Households will then be sampled from these catchment areas (see data section for more detail). During data collection, the survey team will ensure that the health facility actually used for each service of interest is accurately recorded so that any contamination can be measured..

Data

Methods for data collection

The quantitative part of the evaluation will rely on two main sources of data to answer the impact evaluation research questions identified:

1. Household surveys: a household survey will be implemented at *baseline* (i.e., before implementation of PBF begins), and at *endline* (i.e., after PBF has been implemented for two years). This will also include a specific household survey sample for enrollees in the community-based targeting program at *baseline* and *endline.*
2. Facility-based surveys: a facility based survey will be implemented at *baseline* and *endline*. The facility survey will include different tools for data collection: health facility

assessment, assessment of health facilities records, providers' questionnaire, direct observations, and patient exit interviews.

The impact evaluation will use the HRITF survey instruments as a starting point and tailor them to the needs of this research and to the Congolese context. Table 7 below summarizes the data sources for the impact evaluation.

The same facilities included in the baseline facility sample will also be visited at endline. Households surveyed at baseline will also be visited at endline, and will be included in the endline sample, if they continue to meet eligibility criteria. Additional households may be sampled at endline if necessary to meet sample size requirements.

To evaluate the precision and effectiveness of enrollment in the safety net program, households who are identified and enrolled in the program will be interviewed using the same household survey questionnaire as the baseline and endline surveys, and will take place immediately after enrollment into the program, and then again will be included in the endline survey.

The household and health facility surveys will be conducted nationwide using random sampling at the population level in order to establish baseline indicators for the entire health project. The following sample size estimates refer to only the four departments where the impact evaluation will be conducted.

Table 2: Additional departments included in the baseline survey

Departments	**Circonscriptions Socio Sanitaire – CSS (Districts)**
Cuvette-Ouest	Itoumbi
	Ewo
Kouilou	Hinda-Mvouti – Tchiamba Nzassi
	Madingo-Kayes-Kakamoeka-Nzambi
Lékoumou	Zanaga-Bambama
	Sibiti
Likouala	Enyellé-Bétou
	Impfondo
Sangha	Souanké
	Ouesso

Facility-based survey

The facility survey will be conducted in all 285 CSIs and 35 hospitals in the country. All facility team visits will be unannounced. The facility-based survey includes multiple components. The sample of health workers, patient-provider observations and client exit interviews will be selected to enable findings from these three components to be linked.

Facility assessment module

The facility assessment module seeks to collect data on key aspects of facility functioning and structural aspects of quality of care. The respondent for this module will be the individual in charge of the health facility at the time when the survey team visits the health facility. The main themes to be covered by the facility assessment include:

- Facility staffing, including the staffing complement of the facility, staff on duty at the time of the survey team's visit and staff present at the time of the survey team's visit
- Facility infrastructure and equipment
- Availability of drugs, consumables and supplies at the health facility
- Supervision
- Record keeping and reporting to the Health Management Information System
- Facility management
- Official user charges at the facility
- Revenues obtained at the health facility, and how revenues have been used

Health worker interview module

A stratified random sample of clinical health workers with maternal and child health service delivery responsibilities at sampled health facilities will be interviewed as part of this module. The main themes to be covered by this module include:

- Role and responsibilities of the interviewed health worker
- Compensation, including delays in salary payments
- Staff satisfaction and motivation
- Technical knowledge on Maternal and Child Health. The latter will be assessed through the use of vignettes. The vignettes will be focused on services to be purchased under PBF, tailored to the epidemiological profile of Congo and will keep in mind national protocols. The vignettes will be finalized at a later stage.

A stratified random sample of 4 health workers will be taken at each of the 285 primary care facilities (CSIs) resulting in a maximum of 1140 health worker interview observations. For all health facilities with less than 5 health workers, all health workers present at the facility will be interviewed. A sample of 10 health workers providing maternal and child health services at hospitals will also be included.

Observations of patient-provider interaction module

While the health worker interview module collects information on what health workers know, the purpose of this module is to gather information on what health workers actually *do* with their patients. A member of the survey team will therefore observe consultations with a systematic random sample of patients under five presenting with a new condition (i.e., not for follow-up visits or routine) and new ANC clients. The observer will use a structured format to note whether key desired actions are carried out. In the case of patients under five, the instruments will be focused on whether IMCI protocols are followed. For ANC clients, the instruments will examine whether key desired actions (including counseling) are carried out. As primary care facilities do not offer ANC services on all days of the week – typically these are offered 2 days each week – we propose to implement the ANC observations module in a sub-sample of facilities. We expect that 2 facilities out of every 5 surveyed will offer ANC services on the day of the survey team's visits. We anticipate, therefore, that the patient provider ANC observation module will be implemented in approximately 113 facilities. Under-five patient provider observations will likely be feasible at all the health facilities visited. 5 under-5 and 5 ANC observations will be undertaken at each facility where these modules are implemented. We therefore anticipate a total of 565 ANC observations and 1,425 under-five observations. A sample of 10 ANC and 10 under-5 observations will be collected at hospitals as well.

Patient exit interviews

A systematic random sample of 15 patients visiting the facility (5 patients aged under-five and 5 ANC patients, and 5 patients aged 5 and above) will be interviewed to assess the patient's perception of quality of care and satisfaction at all 285 primary care facilities surveyed. If the patient is a child, the child's caregiver will be interviewed. The 5 under-fives included in the patient exit sample will be the same 5 children whose consultation with a provider was observed. In addition to this, exit interviews will be conducted with all ANC clients whose consultation with a provider was observed. In total we expect 2,850 exit surveys with patients who visited the health facility for curative care consultations and 565 exit surveys with ANC clients. Exit interviews will be conducted with patients from the sample of 10 ANC and 10 under-5 observations collected at hospitals.

Household survey

The household survey will be conducted in all 12 departments. Households to be surveyed will be selected using a two-stage sampling techniques. The household survey will be stratified at the health district level. For each of the 40 health districts, we will randomly select 8 Enumeration Areas (EAs) based on a sample frame which we hopefully can get from the census office. In each of the 40*8=320 enumeration areas a dedicated listing team will do a household listing, which will collect information on the presence of women 15-49 as well as a standard means test (verify the ownership of a few assets). From this listing, 20 households will be

randomly selected for the survey as usual. In addition, 5 households meeting the poverty criterion will be interviewed in each enumeration area. The total expected sample size is thus 320*25= 8,000.

- Number of clusters (i.e. EA) = 320
- Number of observations by cluster (general)= 20
- Number of observations by cluster (poor)= 5
- Total number of observations= 8,000
- Design effect assumed= 2.25
- Alpha = 0.05

The instrument will be administered to women in sampled households who have delivered a baby within the two years preceding the survey. The main themes covered in the household survey include:

- Socio-economic status (the household survey includes several modules for SES estimation, including consumption, expenditure, revenue and household assets).
- Health behaviors for MCH services
- Health seeking behaviors, barriers to use and health service use
- Household health expenditures
- General perceptions of health service quality
- A specific module related to household visits
- A specific module related to household members MCH knowledge

In addition, the survey teams will weigh and measure the height of all children under 5 years of age present in the household during the survey team's visit.

Qualitative survey

To explain results from household survey and health facility survey, we will select a sample of patients and providers at the time of the endline study. A specific focus of the qualitative work will be how stakeholders at the decision-making and service delivery (patients, providers and community members) experience PBF in conjunction with the household visits and community-based targeting demand-side interventions. Is the targeting strategy culturally appropriate to the context? Is it seen as precise in its targeting and transparent in its selection process? Are there ways to improve and strengthen the interventions? Are household visits for behavior change an effective strategy for improving health behaviors?

Defining *a priori* a sample size and a sampling strategy is beyond the scope of a qualitative study. Qualitative inquiry assumes that information is collected until redundancy and saturation

are reached. The interviewees will be purposely selected on the basis of the results generated by the preliminary analysis of quantitative data emerging. Data will be analyzed inductively using a grounded theory approach. As qualitative research is not planned until the endline of the impact evaluation, the team will further explore topics and methods to be applied for the qualitative research during the first year of operations, in order to assure that the research questions are relevant and clearly defined for the ROC context.

Table 3: Data sources for the baseline and follow-up household and health facility surveys

Data	Who	Level	Type	Source	Survey Instrument	Frequency	Description of Data
Household survey	Currently pregnant women; Women who have had a child in the 2 years preceding the survey n=8,000	Household	Quantitative	Primary	Adapted HRITF Household Survey Instrument	Two times: Baseline & endline	Health service use, health care seeking behaviors and barriers to use for MCH services, health expenditures, perceptions of health service quality
Household survey	Currently pregnant women, non-pregnant women who have had a child in the 2 years preceding the survey, children under five n=8,000	Household survey	Anthropometry & biomarkers	Primary	Not applicable	Two times: Baseline & endline	Height and weight measurements
Household survey for targeting programs	Enrollees in targeting program n= known upon enrollment	Household survey		Primary	Not applicable	Twice: Upon enrollment & Endline	Assets, consumption, health service use, health care seeking behaviors and barriers to use for MCH services, health expenditures,
Facility assessment	Facility in-charge n=285	Facility	Quantitative	Primary	Adapted HRITF health facility questionnaire	Two times: Baseline & endline	Facility staffing, infrastructure, drugs supply, equipment,

Data	Who	Level	Type	Source	Survey Instrument	Frequency	Description of Data
							supervision, HMIS reporting and management, user charges, facility revenue
Health worker interviews	Health care workers n=1,140	Facility	Quantitative	Primary	Adapted HRITF Health Facility Questionnaire	Two times: Baseline & endline	Staff work load, compensation, motivation, satisfaction and knowledge
Patient-provider observation (Under-five & ANC)	First time ANC clients n=565 New under-5 patients for curative care n=1,425	Facility	Quantitative	Primary	Adapted HRITF Health Facility Questionnaire	Two times: Baseline & endline	Treatment and counseling provided to patients.
Patient exit interviews	First time ANC clients n=565 New under-5 patients for curative care n=1,425 New over-5 patients for curative care n=1,425	Facility	Quantitative	Primary	Adapted HRITF Health Facility Questionnaire	Two times: Baseline & endline	Patient's (or caretaker's) perception of quality of care and satisfaction
Incremental costs of implementing PBF or comparison group interventions	Not applicable	Performance Purchasing Agency	Quantitative	Secondary	Administrative records and reporting	Periodic reporting as PBF commences	Costs incurred in implementing PBF or comparison group interventions

Data collected

Two sets of indicators have to be defined, the first will refer to utilization: quantity of services provided, the second group of indicators is about quality of care.

The coverage indicators will reflect the utilization of maternal and child services (antenatal, deliveries, postnatal services, family planning) as well as children services and immunization. They will also reflect on equity. The data will be collected through the above-mentioned tools.

Table 4: List of coverage indicators

	Indicators
1	% of women who have had 1 antenatal care visits in most recent pregnancy
2	% of women who have had 4 or more antenatal care visits in most recent pregnancy
3	% of women who received at least 1 dose of malaria intermittent preventive treatment
4	% of women who received at least two tetanus toxoid vaccinations in most recent pregnancy
5	% of women who had skilled birth attendance
6	% of women who came for postnatal visit after most recent pregnancy
7	% of women who knew at least one modern family planning method
8	% of women reporting the use of modern contraceptive methods
9	% of unmet need for Family Planning
10	% of children under 1 year who are fully immunized
11	% of children under 3 years who have received Vitamin A
12	% of complicated malaria treated according to protocol
13	% of childhood diseases screened according to the IMCI approach
14	% of children aged between 11 and 59 months who have participated in growth monitoring in the previous month
15	% of children aged under 6 months who are exclusively breastfed
16	% of wasting and stunting among under 5
17	% of positive malaria rapid diagnosis test
18	% of anemia among women and under 5
19	% of poor households covered by the community-based targeting system
20	Number of consultation per year by socio-economic status
21	Household member knowledge on key MCH topics

The quality of care indicators will be divided into four dimensions and some examples are given in Table 5. Based on previous research (Hulton et al., 2007; Bruce, 1990), this study defines quality as the result of the interaction between structural, process, and experiential elements coming together during the provider-patient encounter. Accordingly, we will assess quality along all three dimensions: (1) structural elements, i.e. availability of equipment, drugs, staff; (2) process elements, i.e. providers' compliance with national and international standards; (3) experiential elements, i.e. meeting both providers' and clients' expectations on service delivery.

Table 5: Indicators of quality of care

Dimensions of quality	Indicators	Tools used
Structural elements	Availability of materials: in place, functioning and ready accessible (check list) Average availability of health workers Cleanliness of health facility Availability of guidelines Availability of essential drugs (check list) Number and training of staff members	Health facility assessment, Providers interviews
Process elements	Correct management of the patient and diagnosis: task, activity performed according to check list Appropriate cases documentation (facility records, delivery registers, referral forms…) Correct management of childhood diseases Correct management of malaria cases Correct management of tuberculosis cases	Exit interviews, Observation of patients-providers encounters, Assessment of health facility record
Experiential elements	Providers satisfaction Providers motivation Patients experience in the health facility Patients perception of quality of care Patients satisfaction	In-depth interviews with providers and patients, Providers questionnaire, Patients questionnaire

Ethical review and clearance

Ethical clearance for the impact evaluation is to be obtained from an in-country (i.e., in Congolese) Institutional Review Board. The IE team will incorporate obtaining the necessary ethical clearances in the terms of reference for the research agency that has been contracted to implement the baseline research. The clearance process will begin as soon as the research agency is contracted.

Timeline

Table 6 below sets out the time line for the impact evaluation by fiscal year. The baseline survey will be initiated and completed before PBF implementation begins. Survey data collection will be conducted in April-June 2014. We anticipate that the PBF implementation will begin in July-August 2014, and endline data collection will be implemented after two years in April-June

2016. Prior to beginning PBF implementation, health districts and facilities will be randomized to the study groups in a public ceremony (PBF Pilot Initiation Workshop). Since all health facilities will be sampled in the baseline random assignment to treatment or comparison groups does not need to be conducted before the baseline. Dissemination workshops are planned to disseminate both baseline and endline findings. In addition, impact evaluation findings will be disseminated to a wider international audience by publishing the final evaluation report as a working paper.

The timelines presented below will be discussed and finalized with the Ministry of Health in the Republic of Congo during an impact evaluation workshop that will be held in Brazzaville in October 2013.

Table 6: Timeline

	FY 2014				**FY 2015**				**FY 2016**				**FY 2017**			
Phase	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Program Design																
Impact Evaluation Design																
Evaluation Preparation																
Baseline Data Collection																
Identification and enrollment of the poor through CBT																
PBF Pilot Initiation Workshop																
Initiation of PBF																
Baseline Data Documentation and Storage																
Baseline Analysis and Report																
Baseline Dissemination Workshop																
Evaluation Preparation																
Endline Data Collection																

	FY 2014				FY 2015				FY 2016				FY 2017			
Phase	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Endline Data Documentation and Storage																
Impact Analysis and Report																
Endline Dissemination Workshop																

Policy implications

At the national level, the tight link between the PBF operational team and the research team, fostered by regular information exchange, will ensure that research findings can quickly be translated into adaptation of the implementation. Should the program identify barriers to the successful implementation of the PBF intervention, weaknesses of the scheme, or unexpected negative effects on the coverage and quality of health care services (both those directly targeted by the PBF intervention and other relevant maternal and child health care services), the Ministry of Health and Ministry of Social Affairs its implementation partners will have the opportunity to promptly intervene with adequate measures. It also will inform the Government and build the basis for the decision whether to extend the PBF approach used, to other parts of the country.

At the international level, this study will produce new evidence on the expected and unexpected effects of PBF interventions on quality of and access to maternal and child health services. The mixed methods approach adopted by the research team will be instrumental in this regard, allowing the research team not only to quantify the effects of the PBF intervention on quality, but also the dynamics through which such effects are produced. Understanding such dynamics represents an essential element for the design of future relevant health policies in the Republic of Congo as elsewhere in SSA.

Dissemination

The findings from this research project will be disseminated at the national, regional, and international level.

At the national level, dissemination sessions will be conducted to ensure outreach to all collaborative parties engaged in the project, including district, regional, national, and international authorities (MoH, World Bank, health care providers and community representatives). In collaboration with the Government, a final workshop will be held to discuss with all relevant stakeholders the implications of the study results in relation to the scaling-up

potential of the initiative. In addition, at the end of each cycle of work, ad interim results will be disseminated.

At the regional (i.e. continent-wide) level, findings will be disseminated to reach health policy makers and international partners beyond those directly involved in the Republic of Congo. First, since this is part of a bigger HRITF multi-country IE, international dissemination will be channeled through the World Bank's larger HRITF impact evaluation initiative.

At the international level, findings will be disseminated among the scientific and policy making community by means of a series of scientific publications in peer-reviewed journals and of oral presentations at relevant international conferences.

Research team

Several institutions will constitute the research team:

- World Bank (Republic of Congo health team, WB HRITF impact evaluation team based in Washington, D.C)
- Survey firms for baseline and endline surveys
- Harvard School of Public Health, Department of Global Health and Population
- Ministry of Health, Republic of Congo: the PBF Technical Unit and Project Implementation Unit

Specifically, the research team includes the following individuals:

- Paul Jacob Robyn, Health Specialist, AFTHW. Jake Robyn will be the Principal Investigator and co-TTL for the impact evaluation.
- Günther Fink, Assistant Professor of Health Economics at Harvard School of Public Health, will be co-Principal Investigator for the impact evaluation.
- Hadia Samaha, Senior Operations Officer, AFTHW. Hadia Samaha is the TTL for the impact evaluation and for the larger Health Sector Strengthening Project II within which this pilot is nested.
- Gyuri Fritsche, Senior Health Specialist, AFTHW. Gyuri Fritsche will lead technical inputs to the PBF operation.
- Gervais Yama and Hamadou Saidou will play field and technical coordination roles in the implementation of the IE surveys and interventions.
- Phillippe Leite, Senior Social Protection Economist, AFTSW. Phillippe Leite is the TTL for the Social Protection project.
- Maud Juquois, Health Economist, AFTHW. Maud Juquois will provide technical and coordination support to the IE.
- A national team in charge of overseeing implementation of the impact evaluation will be established. The team will consist of representatives from the Ministry of Health and partner

development institutions (WHO, UNFPA, UNICEF in particular). A focal point within this team will coordinate relations with other actors within the Ministry of Health, notably actors at the central, regional and district levels involved in the Impact Evaluation.

A local or international research firm will be recruited to design and implement data collection and analysis for the baseline of the impact evaluation. This research firms will work under the guidance of the national team and experts from the World Bank.

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Annex 1: Power calculations

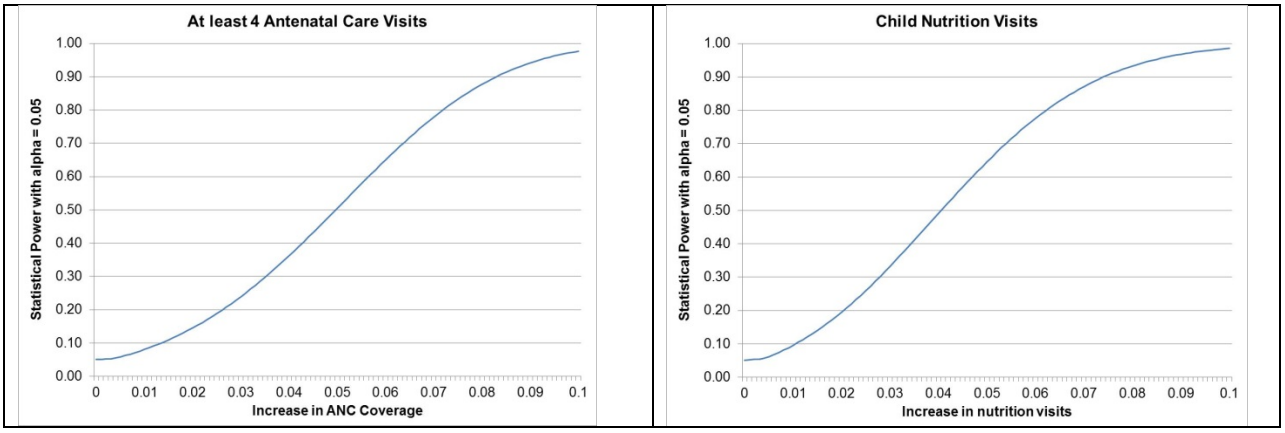
The impact evaluation outlined in this document has two principal objectives: first, to evaluate the impact of PBF on health service coverage and quality, and second, to assess the marginal impact of additional community-based interventions in areas targeted by PBF.

Part I: Assessing the Impact of PBF

Given the rather complex nature of the PBF intervention, the primary unit of randomization for the PBF program will be health districts. In addition to the 11 districts in the 3 departments where the program has been pre-piloted, an additional 10 districts from the 4 additional departments covered by the project will be randomly selected for the program for the first two years. From the remaining 20 districts, 10 districts will be targeted by the program after 2 years; no PBF program is currently planned for the remaining 10 districts. In terms of evaluation, this implies 21 treated, and 20 untreated districts over the evaluation period. With an average number of 7 health care facilities in each district, and a targeted sample size of 20 households in each area, we expect a sample size of approximately 2900 households in the treated area, and a sample size of about 2800 households in control area.

With this sample size, and assuming an intra-class correlation coefficient of 0.05, the study is powered to detect a 7 percentage point increase in adequate antenatal care (baseline coverage 79% according to DHS), and a 6 percentage point increase in child nutrition checkups (baseline coverage 9%). Figure 1 illustrates the statistical power by effect size for the two variables of interest.

Figure A1: Statistical power to detect PBF impact



Part II: Assessing the Impact of Complimentary Interventions

To assess the effectiveness of complimentary interventions within the PBF framework, we will randomly assign three different intervention packages at the facility level. With a total of 150

facilities across the 21 treated districts, we will sample households across the four groups as follows:

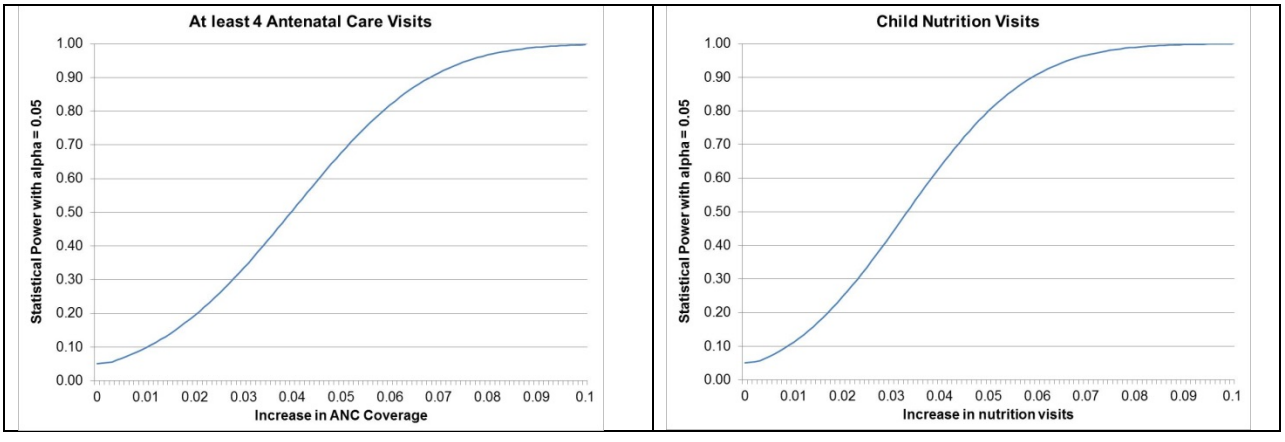
Figure A2: Facility assignment within PBF areas

T1: PBF only 37 health facilities 740 households	***T2: PBF + pro-poor targeting through use of pre-identification community-based targeting*** 37 health facilities 740 households
T3: PBF + household visits according to protocol 37 health facilities 740 households	***T4: PBF + PBF + pro-poor targeting through use of pre-identification community-based targeting + household visits according to protocol*** 37 health facilities 740 households

The main empirical question we aim to address with the independent evaluation is whether complimentary interventions increase service coverage within a PBF framework. Empirically, the first comparison will be between areas just getting the PBF program (740 households), and areas getting other supportive interventions (2220 households). Given much smaller design effects with facility-based interventions (with the assumed ICC of 0.05, the anticipated DEFF is 2), we are powered to detect relatively small increases in service coverage. More specifically, as illustrated in Figure A3, the study is powered to detect 5 percentage points increases in child nutrition visits, and 6 percentage point increases in the percentage of pregnant women with 4 or more antenatal care visits.

We will also analyze the relative impact of the two additional interventions; for this comparison across arms, the statistical power is slightly more limited, with effect sizes of 7 (child nutrition) and 8 (ANC) percentage points needed to attain power 0.8 at the usual 95% confidence level.

Figure A3: Statistical power to detect impact of complimentary interventions



Annex 3: List of Departments, CSS (districts), and health facilities included in the impact evaluation surveys, including CSS randomization results

Department	CSS	PBF/Control/Other	Number of primary care facilities
Bouenza	Loutété	PBF	4
	Madingou	Contrôle	6
	Mouyondzi	Contrôle	6
	Nkayi-Loudima	PBF	13
Total Bouenza			**29**
Brazzaville	Bacongo	PBF	10
	Madibou	PBF	14
	Makélékélé	PBF	18
	Mfilou-Ngamaba	PBF	18
	Moungali	Contrôle	15
	Ouenzé	Contrôle	17
	Poto-Poto	Contrôle	13
	Talangaï	Contrôle	33
Total Brazzaville			**138**
Cuvette	Alima	Contrôle	10
	Mossaka-Loukoléla	PBF	1
	Owando	PBF	5
Total Cuvette			**16**
Cuvette-Ouest	Etoumbi	Autre	6
	EWO	Autre	11
Total Cuvette-Ouest			**17**
Kouilou	Hinda-Mvouti	Autre	9
	Madingo-Kayes	Autre	10
Total Kouilou			**19**
Lékoumou	Sibiti	Autre	19
	Zanaga	Autre	7
Total Lékoumou			**26**
Likouala	Enyelle-Betou	Autre	7
	Impfondo	Autre	9
Total Likouala			**16**
Niari	Dolisie	PBF*	24
	Kibangou	PBF*	13

	Mossendjo	PBF*	13
Total Niari			**50**
Plateaux	Abala	PBF*	8
	Djambala-Lekana	PBF*	15
	Gamboma	PBF*	15
Total Plateaux			**38**
Pointe-Noire	Loandjili	Contrôle	13
	Lumumba	Contrôle	21
	Mongo Mpoukou	Contrôle	12
	Mvoumvou	PBF	10
	N'goyo	PBF	12
	Tié-Tié	PBF	17
Total Pointe-Noire			**85**
Pool	Goma tse tse	PBF*	12
	Igne ngabe mayama	PBF*	20
	Kindamba-Vinza	PBF	10
	Kinkala boko	PBF*	21
	Mindouli	Contrôle	18
Total Pool			**81**
Sangha	Ouesso	Autre	12
	Souanké	Autre	4
Total Sangha			**16**
Total PBF (new)			**132**
Total PBF (old)*			**141**
Total PBF (all)			**273**
Total Control			**164**
Total Other			**94**
Total			**531**

*included in PDSS I pilot

Annex 4: Facility-level randomization estimations by Department

Département	Nombre CSI disponible	Pourcentage sur	Nombre		Pourcentage par secteur		Stratifié Public/ Privé	T1		T2		T3		T4		Controle	
			Privé	Public	Privé	Public		Privé	Public	Privé	Public	Privé	Public	Privé	Public	Privé	Public
Total Bouenza	**29**	5%	**7**	**22**	24%	76%	Oui	1	5	2	6	2	5	2	6	1	11
Total Brazzaville	**138**	26%	**101**	**37**	73%	27%	Oui	10	5	10	5	10	5	10	5	61	17
Total Cuvette	**16**	3%	**1**	**15**	6%	94%	Non	0	1	0	2	0	1	0	2	1	9
Total Cuvette-Ouest	**17**	3%		**17**	0%	100%	N/A	0	0	0	0	0	0	0	0	0	0
Total Kouilou	**19**	4%	**2**	**17**	11%	89%	N/A	0	0	0	0	0	0	0	0	0	0
Total Lékoumou	**26**	5%	**4**	**22**	15%	85%	N/A	0	0	0	0	0	0	0	0	0	0
Total Likouala	**16**	3%	**5**	**11**	31%	69%	N/A	0	0	0	0	0	0	0	0	0	0
Total Niari	**50**	9%	**13**	**37**	26%	74%	Oui	3	9	3	10	4	9	3	9	0	0
Total Plateaux	**38**	7%	**6**	**32**	16%	84%	Oui	1	8	2	8	1	8	2	8	0	0
Total Pointe-Noire	**85**	16%	**59**	**26**	69%	31%	Oui	7	4	6	5	6	4	6	4	34	12
Total Pool	**81**	15%	**25**	**56**	31%	69%	Oui	5	11	4	11	5	11	5	11	6	12
Total Sangha	**16**	3%	**8**	**8**	50%	50%	N/A	0	0	0	0	0	0	0	0	0	0
Ensemble PBF	**132**	25%	**72**	**60**	55%	45%											
Ensemble PBF*	**141**	27%	**37**	**104**	26%	74%											
Ensemble PBF (tous)	**273**	51%	**109**	**164**	40%	60%											
Ensemble Contrôle	**164**	31%	**103**	**61**	63%	37%											
Ensemble Autre	**94**	18%	**19**	**75**	20%	80%											
Ensemble	531	100%	**231**	**300**	44%	56%		27	43	27	47	28	43	28	45	103	61