Health workers in the Democratic Republic of Congo: an exploration of their motivation, incentives, and the effects of an intervention to improve their remuneration by government

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Thesis submitted in accordance with the requirements for the degree of Doctor of Philosophy

of the University of London

October 2019

Department of Global Health

Faculty of Public Health and Policy

LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE

Funded by the Department for International Development

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Abstract

Health worker motivation influences the performance of health services. In the Democratic Republic of Congo (DRC), not all health workers are remunerated by the government, negatively affecting their motivation. This leads workers to seek revenue from other sources, including user fees and private practice, but the extent to which different sources make up their total revenue has not been quantified. To improve motivation, donors have employed performance-based financing (PBF), which represents another, albeit unstable, source of income.

The research for this thesis was set within a health systems strengthening programme called ASSP (access to primary health care) in the DRC, which phased out donor-financed PBF from a previous programme and implemented a complex intervention aiming to increase the prevalence of government payments to health workers. Using mixed methods, this study: describes the sources and amounts of income making up a health worker's total remuneration; develops and validates a tool to measure health worker motivation; compares differences in motivation amongst workers who previously received PBF with workers who never received PBF; and, evaluates the complex intervention described above.

Several income sources make up a health worker's total remuneration. A valid tool measuring health worker motivation was developed and indicated workers who previously received PBF scored significantly lower on almost all motivation dimensions compared to those who never received PBF. With respect to the complex intervention, an adaptive approach to implementation and evaluation was needed given the dynamic nature of the health system.

The findings have important policy implications. Better coordination amongst actors involved in health worker remuneration is needed, and incentive structures should be based on dimensions of motivation relevant to workers. For fragile states, the implications of transitioning away from donor payments and the importance of continuing work on civil service pay reform are identified.

Acknowledgements

Firstly, I would like to thank my main supervisor, Jo Borghi. I first met Jo back in 2013 when I commenced the PhD and she has been the most supportive and attentive supervisor I could have ever asked for. I am truly grateful to have had you as my mentor, and have found your guidance throughout this endeavour to be invaluable.

I am also extremely grateful to Sandra Mounier-Jack who was initially on my advisory committee and later joined as my secondary supervisor. You have been brilliant at seeing the bigger picture in everything I have worked on, and I have learned an immense amount from both you and Jo.

On the topic of learning from others, Julia Lohmann has taught me so much about motivation measurement. It has been a real privilege to have collaborated with you on much of the work arising out of this PhD as well as getting to know you as a friend.

This PhD, however, would never had happened had it not been for the initial support of Chris Pycroft and Natasha Palmer. Chris - you gave me permission to go ahead with a PhD provided I made a good enough case. Not many people in your position would have been bold enough to have allowed that but you did. I will always be grateful to you for having taken a chance on me and granting me this amazing opportunity. Natasha – without even knowing much about me, you kindly agreed to be my main supervisor when I submitted my research proposal to you. A lot of the conceptual thinking behind this PhD was influenced and shaped by you.

I would also like to thank my advisory committee for their insightful comments and healthy challenge: Mary de Silva and Mylene Lagarde. And a big thanks to Matt Quaife for reading my thesis within a short time-frame and for providing excellent comments despite not knowing about my research before that!

Sincere thanks go to all those involved from Tulane University and the Kinshasa School of Public Health who facilitated all of my work in the field. Specifically, David Hotchkiss, Ann-Marie Yongho, Janna Wisniewski, Paul-Samson Lusamba-Dikassa and Lauren Blum. I could not have completed my fieldwork without the help of talented

local researchers Anicet Yemenwi and Célé Manienga. I am also grateful to all those who agreed to participate in this study.

A great side-effect of this PhD has been meeting some lovely people along the way, including other PhD students. In particular, Rosalind Millar and Katherine Arbuthnott for the laughs over coffee whenever I have been at the school.

I am lucky to have amazing friends like Shelley Dua and James Dowey, the PhD power couple for inspiring me to keep going, and Sarah McRobbie for always being there. Nana Aslam and my uncle, Ashok Sethi, for putting me up in their London digs at various points when I met my supervisors. The Pakistani posse – Storm, Alex, Solène, Joris, Richard, Viviana and Alice – for the well-needed study breaks and great conversations (often over good food).

Family have been my ultimate support system. My mum and dad, sister and brother-in-law, nephew Dhilan, Evelyn, Fraser, Keira, and Jonny – for always asking me how the PhD is going and providing me with so much encouragement and pragmatic advice over the years.

My darling Oran whose hugs, giggles and sense of humour have kept me going when I have had to work weekends, balancing working on the PhD against my full-time job. Thank you for being so understanding that mummy has been so pre-occupied; you were born during this PhD and I'm looking forward to being more of an attentive mummy from now on. Also thanks to "Pumpkin" who I can't wait to arrive but ensured I got my act together before my due date!

However, the biggest thank you goes to my incredible husband, Euan, who has been my biggest supporter and cheerleader throughout. You have empathised with me when I felt the work was too much but always motivated me to keep going, even when I wanted to give up. Right up to the end, you even proof-read the last version of the thesis before I submitted it. I could never have done this without you. This thesis is dedicated to you.

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APPENDICES TO THESIS

List of figures and tables

List of abbreviations

ATH	Access to Health care
ASSP	Accès Aux Soins de Santé Primaire (Access to primary health care)
CFA	Confirmatory Factor Analysis
DFID	Department for International Development
DRC	Democratic Republic of Congo
HRIS	Human Resources Information System
IMA	Interchurch Medical Assistance Worldhealth
KSPH	Kinshasa School of Public Health
NGO	Non-governmental Organisation
OLS	Ordinary Least Squares
PhD	Doctor of Philosophy
RRT	Randomised Response Technique
SE	Standard Error
UK	United Kingdom
US	United States
USD	United States Dollars

Preface

In 2011, my husband who was working for the Department for International Development (DFID) secured his first overseas posting in Kinshasa, the Democratic Republic of Congo (DRC). I was a public health registrar at the time, but the opportunity to work in Africa had been a joint dream of ours for a long time. The stars aligned, and I managed to find a job as a locally employed health adviser with DFID.

I was completely new to the world of international development, and so very inexperienced. While working with the DFID DRC health team, I noticed the operational research plan for DFID's new major health systems strengthening programme lacked a focus on human resources for health, despite a number of proposed interventions which would potentially affect their motivation and performance.

I had always been interested in research and wanted to do a PhD (Doctor of Philosophy). So, I wrote and presented a research proposal to the Head of the DFID DRC Office at the time to work on the subject contained in this thesis. After some correspondence by email and a phone call, I gained the support of Dr Natasha Palmer at the London School of Hygiene and Tropical Medicine to supervise me and started this PhD in October 2013.

I conceived all of the studies contained in the thesis and was the principal investigator. I led on the planning, design of data collection, collection of all data from qualitative interviews, data analysis and write up of all of the studies. I was also responsible for managing the budget of this operational research component within the health programme as well as contracting and training local researchers. This PhD is the culmination of that work. I realise now there are a lot of things I would have done differently had I better understood the field when I began this undertaking. Hence, much of my thesis reflects on the challenges of working in a fragile state, limitations of the research, and what I could have done differently.

PART I: BACKGROUND TO THE THESIS

1. Introduction

1.1 Health worker motivation and incentives

Primary health care workers in low- and middle-income countries usually work in challenging environments (Vasan et al., 2016); typically, there is a shortage of workers as well as inequitable distribution of providers within the country (World Health Organization, 2006, Chopra et al., 2008). The health workforce has often received inadequate or incomplete education and training, and faces significant resource shortages within facilities (World Health Organization, 2013). Yet, health workers have a critical role with respect to health care delivery.

Problems relating to service provision due to the poor performance of health workers in low- and middle-income countries are well documented in the literature (World Health Organization, 2006, Rowe et al., 2005, Garcia-Prado and Chawla, 2006), and include low uptake of health care due to poor health worker practices. Many of the causes are rooted in a failing health system, but also a poorly motivated workforce (Dieleman and Harnmeijer, 2006, World Health Organization, 2013, Chopra et al., 2008).

Health worker motivation is defined as the level of effort and desire to perform well (World Health Organization, 2006). It is recognised in the literature as a critical influence of health worker performance (Franco et al., 2002, Rowe et al., 2005), thereby affecting the quality of health service delivery (World Health Organization, 2006). By understanding what drives motivation, strategies aimed at improving health worker motivation can be implemented which then have a bearing on performance.

In general, policy-makers can influence motivation through the provision of incentives. These may either be non-financial incentives, such as career-development, supportive supervision and training (Agyepong et al., 2004, Manongi et al., 2006, Bailey et al., 2016), or financial incentives, for example rural/hardship allowances or pensions (Reid, 2004, Henderson and Tulloch, 2008).

The next section specifically discusses performance-based financing (PBF) - which involves the transfer of funds (at least in part) to health workers on their attainment of

pre-defined outputs or quality indicators linked to performance (Meessen et al., 2011, Witter et al., 2013) - as it is a key financial incentive examined in this thesis. The evidence on the effects of PBF as well as other financial incentives on health worker motivation is expanded further upon in chapter 2.

1.2 Performance-based financing in low-and middle-income countries and fragile states

Particularly in fragile states, government payments to workers are insufficient and systems often dysfunctional; PBF is therefore often introduced as "top-up" rather than addressing underlying system constraints. PBF is based on a powerful assumption, which is that incentives motivate individuals and organisations to perform better. In theory, the approach has the potential to foster system-wide reforms in relation to: human resources, by clarifying roles and responsibilities, and increasing motivation and therefore productivity of staff; financial management, by increasing the autonomy of health structures as well as encouraging the provision of high priority and cost-effective services; service coverage and equity, by expanding services to hard-to-reach groups; and other aspects of health system governance, by increasing accountability to stakeholders (Meessen et al., 2011, Fritsche et al., 2014, Soeters, 2017).

However, recent systematic reviews have concluded that there is limited and poor quality evidence on the effects of PBF on provider performance, the utilisation of services, patient outcomes, or resource-use in low-income countries (Das et al., 2016, Suthar et al., 2017, Eijkenaar et al., 2013, Wiysonge et al., 2017). PBF in low- and middle-income countries has usually been funded by donors and has not taken into account the complexity of the existing health system or given due consideration to sustainability (Paul et al., 2018); there is therefore a risk of creating a dependency on an income source which cannot be continued in the event that donor funding is withdrawn, with potential consequences for health worker motivation. This is in contrast to the implementation of PBF in high-income countries, where it is introduced as a purchasing mechanism embedded in existing financial arrangements, rather than as a top-up from a parallel funding stream.

Furthermore, in fragile states, PBF often occurs in the context of several other alternative revenue streams for workers; this phenomenon of 'complex remuneration' has been described in the literature (Bertone and Witter, 2015). These may include: per diems and allowances, which are payments for specified needs or expenses such as travel (Ridde, 2010); user fees, which are payments made at the point of service use by patients (Lagarde and Palmer, 2011); and informal payments, which are payments by patients to workers that are made outside official payment channels or for purchases meant to be covered by the health care system (Lewis, 2007). A thorough analysis of the overall financial environment of workers is therefore necessary to understanding the potential implications of any changes in different income sources on worker motivation (Bertone and Witter, 2015).

1.3 Research gaps

The literature review in chapter 2 points towards a number of research gaps: (1) PBF is often examined in isolation of other income sources which is problematic given the multiple players and lines of accountability linked to other income sources which may differently influence the activities performed by health workers (2) the multiple sources and amounts of income available to health workers in developing countries is rarely described in its entirety, and there is comparatively little research on the determinants and factors underlying their 'complex remuneration' (3) few academic studies have been published on the implications of withdrawing donor-funded financial incentives on health worker motivation, and (4) there is a lack of rigorous evaluative research on PBF alternatives within fragile states such as strengthening the systems for routine government payments to health workers. The body of work contained in this thesis therefore aims to address these substantial evidence gaps, in order to inform more effective policy measures which will improve the motivation and performance of health workers in low- and middle-income countries or fragile states.

1.4 Study setting

This thesis aims to address the research gaps outlined above within the context of the Democratic Republic of Congo (DRC). The DRC is a post-conflict and fragile country

(Fund for Peace, 2018). Political instability, poor governance, and weak state institutions are the main factors explaining the persistent poverty of the Congolese population. Elite capture leads to corruption at all levels, which takes a heavy toll on public service capacity to deliver key services. In addition, the national payroll system is widely acknowledged to be dysfunctional (Fox et al., 2013, World Bank, 2008), with few public sector health workers receiving any form of government payment, which can negatively affect their motivation and therefore performance.

Between 2008 and March 2013, DFID (Department for International Development) provided funding towards a health systems strengthening programme called access to healthcare (ATH) in the DRC. The programme employed PBF at the facility-level as few workers were receiving a state salary. Under the PBF scheme, health workers received a regular fixed payment and a performance payment contingent on their facility achieving certain performance criteria. Further detail on this programme is given in chapter 3.

In March 2013, the Department for International Development (DFID) started funding a new health systems strengthening programme called ASSP (accès aux soins de santé primaire or access to primary health care), which worked in Equateur, Kasai Occidental, Maniema, Province Orientale and South Kivu provinces of the DRC. Concerns around sustainability led to the decision to firstly phase out the payment of PBF - a legacy of the predecessor health programme – over the first year. During the first few years of ASSP, and only in the province of Kasai Occidental, DFID also financed a pilot for a complex intervention aiming to increase the proportion of health workers paid by government, recognising that this would not only contribute to state capacity building but address a major obstacle to staff motivation.

Both of these interventions would likely have consequences for health worker motivation and performance. Further detail on these two programmes is offered in chapter 3.

1.5 Aim and objectives

The aim of this PhD is to describe the remuneration and motivation of health workers in a sample of provinces in the DRC, exploring differences in motivation between workers who have recently had PBF removed and workers who have not been exposed to PBF. The implementation process and intermediate effects of an intervention to improve motivation by strengthening government payments to health workers will also be evaluated. The specific objectives are summarised below:

Objective 1: To describe and quantify the sources and levels of income for health workers in a sample of public sector facilities in the DRC.
Objective 2: To develop and validate a scale to measure dimensions of motivation among health workers in the DRC, and compare differences in motivation among health workers where PBF has recently been removed with those who never received PBF.
Objective 3: To undertake a process evaluation of a complex intervention aimed at facilitating government payments to health workers.

1.6 Structure of this thesis

Chapter 2 reviews several areas of the literature pertinent to this thesis and the underlying conceptual framework. The literature review covers: theories of motivation, the role of incentives in influencing motivation, how different financial incentives may affect health worker motivation (in particular PBF), and how changes to income sources within overall remuneration structures may affect worker motivation. Chapter 3 provides the contextual background to this research. Chapter 4 then goes on to provide an overview of the methods used to address the objectives of the thesis. Chapter 5 describes a cross-sectional study of the income sources received by health workers in primary care facilities. Chapter 6 describes the composition and levels of motivation of health workers, providing results on the differences in motivation observed between workers who had never received PBF compared with those who had PBF recently withdrawn. A reflection on the methods employed to measure motivation is also described. Chapter 7 then goes on to detail the process evaluation of a complex intervention to improve government payments to health workers. It includes a reflection

on the process of developing the theory of change as well as a commentary discussing the importance of working on interventions which seek to sustainably strengthen payments to health workers as opposed to funding stand-alone PBF schemes. Finally, chapter 8 critically assesses the research, drawing together the major contributions of the thesis and its implications for future policy and research.

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2. Literature review

2.1 Introduction

This literature review begins by describing some of the different theories of motivation which have been applied in low-income countries, and the role incentives play in influencing health worker motivation. As the focus of this PhD relates primarily to financial incentives, the literature on how different mechanisms of provider payment - with specific regard to PBF – as well as overall remuneration structures may affect worker motivation is summarised. Changes to income sources within health worker remuneration structures that are specifically relevant to this PhD are then discussed. These include: the implications of removing PBF payments on motivation, and evidence concerning the effectiveness of interventions to improve government payments to workers. Finally, knowledge gaps addressed by this thesis are identified.

2.2 Health worker motivation

Many health care reforms have sought to improve health system performance through changes that target resource availability, training of workers, and more effective management. Worker motivation, however, has rarely been an objective of reforms (Beaglehole and Dal Poz, 2003, Franco et al., 2002), despite poorly motivated workers having a negative impact on service quality and efficiency (Martineau and Martinez, 1996).

2.3 Definition and theories of motivation

There is broad agreement on the definition of worker motivation, with one of the most commonly used being "an individual's degree of willingness to exert and maintain an effort towards organisational goals" (Leonard and Masatu, 2010, Franco et al., 2002). In essence, motivation is important to bridging the gap between what health workers know they need to do, and what they actually do in practice (Leonard and Masatu, 2010, Leonard et al., 2007).

As motivation cannot be directly observed, this has led to several different conceptualisations of motivation and the factors driving it (Pinder, 2008). The many

theories explaining work motivation have their origins in various disciplines including behavioural economics and psychology (Herzberg et al., 2011, Maslow, 1943, Kanfer et al., 1999, Franco et al., 2002, Deci and Ryan, 1985, Locke, 1997, Vroom, 1964). The two main lines of theories are content and process theories. The former is concerned with an individual's needs and goals, and is concerned with "what" motivates people, while the latter is concerned with the process and "how" motivation occurs (Dolea and Adams, 2005). A recent article on good practice in measuring motivation offers a useful summary of the different types of theories (Borghi et al., 2017), as do Dolea and Adams (2005).

Given many of these theories and conceptual frameworks of motivation have been developed within Western contexts, this section refers to those which have been consistently applied to inform the measurement of health worker motivation in low-income countries.

Herzberg two factor theory

Herzberg's two factor theory hypothesises that a worker's motivation is influenced by a set of 'hygiene' factors, and a set of 'motivator' factors (Herzberg et al., 1966). Hygiene factors are what causes dissatisfaction amongst workers, and include: company policy, supervision, relationships with senior management, work conditions, salary and relationships with colleagues.

Ensuring workers are satisfied with these factors is necessary for the existence of worker motivation, but is only one part of the equation; motivating factors are needed to enhance satisfaction of workers and relate to aspects such as opportunities for a worker to gain status, assume responsibility, and undertake important and meaningful work (Hackman and Oldham, 1976). To date, this theory has been used to understand factors affecting health worker motivation in Mali (Dieleman et al., 2006) and North Vietnam (Dieleman et al., 2003).

Self Determination Theory

Self Determination Theory builds on another theory known as Cognitive Evaluation Theory, which states that influences on worker motivation can be either "intrinsic" or "extrinsic"(Porter and Lawler, 1968, Deci and Ryan, 1985, Stilwell, 2001). Intrinsic

factors refer to the internal desire of health workers to perform a task. For example, health workers are guided by their professional conscience to do their job well. Extrinsic factors refer to the external characteristics of the organisation environment, community and health system. Examples include financial rewards, or praise from colleagues. According to motivation crowding theory, changes to extrinsic factors may also directly affect intrinsic motivation (Frey and Jegen, 2001). The basic assumption is that contingent rewards could undermine a person's innate need to feel autonomous and competent (Borghi et al., 2017).

Self Determination Theory extends Cognitive Evaluation Theory to characterise extrinsic motivation as a spectrum of four different types, each varying in terms of relative autonomy and distinguished by the extent to which they stem from outside a person or within the person (Deci and Ryan, 2000). 'External regulated behaviour' is the most controlled type of extrinsic motivation, and 'introjected', 'identified', and 'integrated' are progressively more self-determined or autonomous.

Recently, this theory has provided the conceptual basis for developing tools to measure the motivation of health workers in Burkina Faso (Lohmann et al., 2017), Afghanistan (Dale, 2014) and Malawi (Lohmann et al., 2018); these scales were subsequently used to evaluate the effects of introducing performance-based financial incentives on the composition of worker motivation.

Kanfer's motivation theory and the Franco framework of motivation

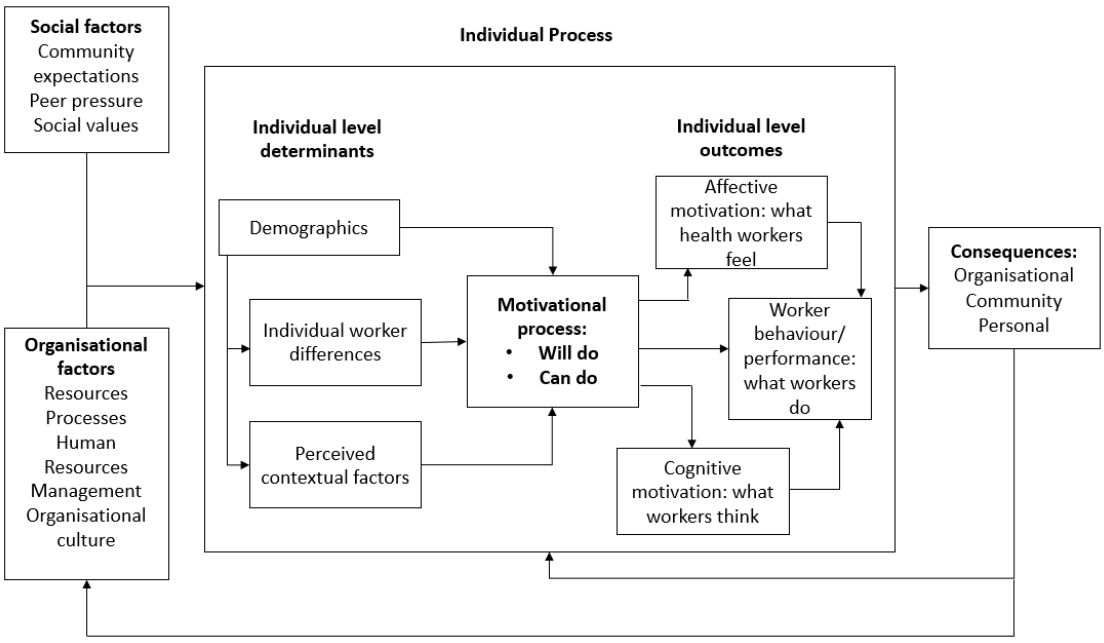
Kanfer (1999) postulated that determinants affecting the alignment of an individual's goals with that of the organisation will influence the "will-do" component of motivation, while the ability to mobilise resources to execute a task will influence the "can-do" component of motivation. Distal determinants of the "will do" aspect of motivation, which cannot be directly influenced by human resource management strategies, are generally stable characteristics such as cultural values and personality. For example, in cultures where family time is important, workers are less likely to accept goals requiring that they work overtime. Proximal determinants, on the other hand, are more flexible and under the control of the organisation. For instance, organisations may attempt to enhance worker motivation by rewarding high-performing individuals. Distal determinants of the "can do" aspects of motivation relate to the

individual characteristics of workers: these include self-confidence, self-concept, work orientation, and self-regulation. Proximal determinants include the provision of complementary inputs (e.g. medicines) as well as clear systems and procedures by the organisation (Mathauer and Imhoff, 2006) which will enable workers to achieve their goals.

Motivation outcomes at the individual level are the net result of the interaction between the "can-do" and "will-do" components of motivation. Outcomes can be affective, cognitive and behavioural. Affective outcomes concern health workers' satisfaction, while cognitive outcomes relate to health workers' perceptions of their job. Behavioural outcomes relate to the performance of health workers.

Building on Kanfer's work, Franco et al. (2002, 2004) developed a conceptual framework illustrating the levels of different determinants of health worker motivation (figure 1). The framework posits that motivation is the result of the interaction between the individual and their work/organisational environment, as well as the relationship between these elements and the broader social context.

Figure 1: Franco's conceptual framework of motivation



Source: (Franco et al., 2004).

The motivational processes operating at the individual level have been described above (Kanfer et al., 1999). Organisational structures and systems and the nature of feedback the worker receives from colleagues will affect workers' experiences of outcomes, which can in turn impact on individual motivation. Community members will have expectations around health service delivery which they may communicate to health workers in order to influence their motivation and performance. Finally, both the communication and content of health sector reforms can influence worker motivation through their effects on organisational factors and/or community determinants.

The Franco framework has now been extensively applied to motivation measurement of health workers in a number of developing countries, including: Kenya (Mbindyo et al., 2009), Ghana (Bonenberger et al., 2014, Prytherch et al., 2012, Alhassan et al., 2013), Zambia (Mutale et al., 2013), Jordan (Franco et al., 2004), Georgia (Franco et al., 2004), Tanzania (Prytherch et al., 2012, Chandler et al., 2009), Burkina Faso (Prytherch et al., 2012), Ethiopia (Hotchkiss et al., 2015), Nepal (Morrison et al., 2015), and South Africa (Penn-Kekana et al., 2005).

Although the theories above have been applied in low- and middle-income country settings, it is still important to ensure they are adapted as needed to the setting (Dolea and Adams, 2005), as interpretations of motivation are known to vary across contexts (Rowe et al., 2005, Machungwa and Schmitt, 1983).

2.4 The role of incentives

One way of influencing motivation is to employ incentives. Incentives are tools used to motivate health workers to perform in a way that is in the interest of both patients and the organisation (Adams and Hicks, 2000, Locke, 1968), and can either be financial or non-financial. Non-financial incentives don't involve direct transfers with monetary value or equivalent to an individual or group (Adams and Hicks, 2000). They may operate through a moral imperative, which may be in the form of social pressure or altruism (Hanson, 2012). Important non-financial motivators include: career development, resource availability, hospital management, supervisory support and recognition (Willis-Shattuck et al., 2008, Dieleman and Harnmeijer, 2006, Stilwell et al., 2004, Dieleman et al., 2003).

Financial incentives are defined as monetary benefits given to a worker, the amount and type or feature of which varies (Lemière, 2011). Direct financial incentives include salaries, pensions, and allowances e.g. for housing and transport (Willis-Shattuck et al., 2008, Dambisya, 2007) while indirect financial incentives include subsidised child-care and transport (Dambisya, 2007).

(Buchan et al., 2000) recognises that a combination of non-monetary and monetary incentives are highly important in creating a reward strategy that meets the needs of individuals as well as the organisation. Although this PhD focuses primarily on the different types of financial incentives paid to workers, this duality is borne in mind throughout.

2.5 Remuneration of health workers and agency theory

Financial incentives make up a health worker's remuneration, which refers to their total income. Remuneration structures may therefore comprise a range of payments determined according to different rules (Buchan et al., 2000). According to economic theory, different mechanisms of paying health workers can vary in terms of the incentives they provide (Prendergast, 1999, Robinson, 2001, Barnum et al., 1995). Consequently, the way in which health workers are paid may influence their motivation and performance in the workplace (Lagarde et al., 2010, Gosden et al., 2000).

How remuneration and incentives may affect health worker behaviour can best be explained through agency theory. Agency theory describes a relationship between a "principal" who delegates a task or authority to an "agent" who performs or makes decisions on behalf of the principal (Jensen and Meckling, 1976). Usually the principal (who is the employer e.g. the government for public sector health care) requires health workers to act on their behalf (i.e. in treating patients) in an agency relationship (Buchan et al., 2000). An asymmetry of information exists between the two parties; the health worker agent is well informed about how to best deliver health services, while the principal (government) is relatively uninformed and relies on the agent to act in their best interests (Eisenhardt, 1989, Kiser, 1999). However, the interests of the two parties are divergent as the task should benefit the government, while the agent incurs a cost due to the effort to perform it. As the government principal cannot perfectly monitor the

agent's behaviour, the health worker agent will maximise their own utility by undertaking less work than is desirable, giving rise to the classic principal-agent problem (Eisenhardt, 1989). The question is therefore how to motivate the agent to act in the best interest of the principal.

At the individual level, increasing health workers' productivity and performance translates into creating an incentive structure which motivates workers to exert the maximum amount of effort, in order to ensure the highest quantity and quality of service provided. According to incentive theory, the purpose of an incentive is to align the interests of the agent (health worker) with those of the principal (the government) (Hockenbury and Hockenbury, 2000). This can be achieved by the principal devising effective mechanisms of paying the agent, which often give the agent a stake in some observable measure of performance, provided the agent is able to influence this measure through their own behaviour.

2.6 Provider-payment mechanisms – what is and what isn't known

In terms of mechanisms of paying health workers, salaries are the most common, where a guaranteed fixed sum is paid irrespective of the amount of services provided. However, workers can be paid in other ways, including: fee-for-service, whereby they are paid for each service administered; and capitation where workers are paid a pre-determined amount per member of a defined population during a fixed period of time (Lagarde et al., 2010). In theory, salaries provide no incentive to increase effort but also do not encourage the provision of unnecessary services. A fee-for-service model can lead to supplier-induced demand, while capitation aims to counteract this but bears a risk of workers providing lower quality care and cream-skinning i.e. choosing less ill patients (Lagarde et al., 2010). Empirical studies suggest that salaries are associated with the lowest use of tests and consultations (Gosden et al., 1999, Brekke et al., 2018), followed by capitation and fee-for-service methods (Krasnik et al., 1990, Davidson et al., 1992, Brekke et al., 2018). However, the difference in the use of resources and number of consultations between workers paid either by capitation or salary is thought to be trivial (Lagarde et al., 2010).

Nonetheless, amongst these standard ways of paying workers, there is no mechanism, or blend of mechanisms, which is deemed to be superior; all have different benefits and disadvantages which can impact on the quality and provision of health care (Barnum et al., 1995). The resulting choice of provider payment approach is therefore usually influenced by the economic, social and institutional context of a particular setting (Barnum et al., 1995). Furthermore, most of the research evaluating the effectiveness of these different types of payments in increasing health worker productivity and performance has been undertaken in high-income countries (Bertone and Witter, 2015), with their effects on motivation of workers in low- and middle-income countries less well understood.

One mechanism of provider payment which is particularly common in fragile states and is usually externally financed by donors in these settings is PBF (Bertone et al., 2018a). PBF can be introduced alongside or in addition to other routine payment mechanisms such as salaries or fee-for-service, and entails health workers being paid – at least in part - on the basis of their performance (Meessen et al., 2011). The financial incentive is paid on a fee-for-service basis which is also contingent on the quality of services being provided (Musgrove, 2011). The assumption underlying PBF is that it will motivate health workers to change their behaviour in order to achieve results (Basinga et al., 2011), yet more research is needed on the exact mechanisms through which PBF operates (Renmans et al., 2016).

Despite the approach having been introduced in many countries, with several pilots also underway (World Bank, 2018), the effects of PBF on quality of care, health worker performance and motivation remain limited and results are mixed (Witter et al., 2012, Renmans, 2016, Eijkenaar et al., 2013, Wiysonge et al., 2017). For example, in Burundi and Rwanda, PBF was reported to improve quality of health care (Bonfrer et al., 2014, Janssen et al., 2015), while in Tanzania, significantly positive effects in service coverage were observed for only two out of eight performance indicators (Binyaruka et al., 2015).

Very few studies have attempted to understand how PBF affects motivation (Basinga et al., 2011, Witter, 2013). Lohmann et al. showed that PBF had both positive and negative effects on workers' intrinsic motivation in Malawi (Lohmann et al., 2018). In

Nigeria PBF successfully increased motivation but it was recognised that addressing other non-financial factors such as the distribution of staff would further improve motivation levels (Bhatnagar and George, 2016). Other studies have indicated that the design and implementation of PBF has important implications for motivation; PBF could have limited effects on motivation, or may even be de-motivating in cases if staff perceive the distribution of payments is not transparent, equitable or timely (Witter et al., 2011, Kalk et al., 2010, Bertone et al., 2016, Ssengooba et al., 2012).

With respect to the DRC, one study showed that PBF led to efficiency gains and improvements in service quality (Soeters et al., 2011), while another study demonstrated that although PBF increased efforts to target service provision, it did not stimulate demand for services, and even resulted in a reduction of intrinsic motivation in workers (Huillery and Seban, 2015).

A more recent paper has concluded that some of the conditions of fragile states, such as low levels of trust within the public system and the greater role of external actors and donors, appear to favour the emergence of PBF approaches (Bertone et al., 2018b). Yet, whether PBF has either led to an improvement in the conditions of fragility or simply circumvented them is still unclear. Given the weak evidence on the effects of PBF, its rapid expansion has not been without debate. While proponents argue that PBF has the potential to foster system-wide reforms and accountability (Meessen et al., 2011, Fritsche et al., 2014, Soeters, 2017), others argue that it has been predominantly donor-driven with a lack of government ownership (Gautier and Ridde, 2017), and may even weaken health the health system (Paul et al., 2018a). Negative unintended effects have been described in Italy, where performance-related pay led to the manipulation of data and provider moral hazard, whereby doctors recommended a higher number of consultations and tests to artificially raise demand for services (Adinolfi, 1998).

In particular, concerns around the financial sustainability of this approach have been raised, as it is often financed through multilateral, bilateral or global initiatives (Fritsche et al., 2014). To date, the government's adoption and scale-up of PBF in Rwanda has been touted as evidence testifying to PBF being sustainably implemented (Meessen et al., 2011). However, this has not been the case for most contexts. A few articles have indicated challenges in other countries such as Benin and Burundi in transitioning from

donor to domestic financing of PBF, as well as integrating PBF into the existing health system (Paul et al., 2018b, Falisse et al., 2014, Peerenboom et al., 2014).

There are no studies which have evaluated the effects of withdrawing PBF schemes on service access and quality in low-income countries (Suthar et al., 2017). This should be a research priority given external grants for PBF are usually of a short duration; furthermore, the cessation of such incentive schemes could result in even lower levels of quality compared to before the introduction of PBF due to newly found expectations from health workers. Consequently, more research into the withdrawal of PBF in these settings is needed given concerns around its sustainability (Paul et al., 2018a).

There is mixed evidence from high-income countries on the effects on service quality when performance-based incentives are removed. In the United States (US), an observational cohort study found that improvements in the management of three common medical conditions were sustained for up to three years after performance-based incentives were removed (Benzer et al., 2014). However, another study from the US indicated that screening rates for diabetic retinopathy and cervical cancer were sensitive to both the introduction and withdrawal of performance-based incentives; screening rates rose for both conditions when incentives were attached, but once removed annual screening rates reduced year on year for both conditions with losses exceeding the gains made during the incentivisation period (Lester et al., 2010). Similarly, quality declined following the removal of incentives in a sample of US health facilities participating in a randomised, controlled trial of incentives to improve hypertension control (Petersen et al., 2013).

Studies in the United Kingdom (UK) have also yielded conflicting results. These have been conducted on the UK's Quality and Outcomes Framework, which constitutes the largest health-related pay-for-performance scheme in the world that has been implemented since 2004. One study found immediate reductions for twelve quality of care indicators in the first year after the removal of financial incentives (Minchin et al., 2018) while another study showed that incentive removal had little effect on documented quality for eight quality outcome framework indicators (Kontopantelis et al., 2014).

Even if PBF could eventually be financed by low-income country governments, there is little evidence on the long-term effectiveness of PBF on health system performance in low- and middle-income countries. However, evidence is becoming increasingly available from developed countries. For example, in the UK, the evaluation of the Quality and Outcomes Framework indicated relatively limited additional improvements in quality and some negative effects, including reduced patient choice (Roland and Guthrie, 2016). Moreover, the UK hospital pay for performance programme Advancing Quality was associated with a short-term (18 month) reduction in mortality, but the decline in mortality was not significant compared to the baseline mortality a further 24 months into the programme (Kristensen et al., 2014). The structure of financial incentives linked to performance did change during the study period from bonuses for good performance to the withholding of a percentage of reimbursement for poor performance. Nonetheless, when using an alternative evaluation method which employed a synthetic control, there was no longer any statistically significant effect even in the short-term (Kreif et al., 2016), calling into question the cost-effectiveness of such strategies.

2.7 Complex remuneration of health workers

A key focus of this PhD concerns the remuneration of workers in the DRC, and in particular, how financial incentives affect motivation. Post conflict states present a particularly interesting context within which to examine health worker remuneration. In contrast with most other countries, the government's ability to remunerate health workers is often poorly functional; few public sector workers receive their state salary at all, the amount received is insufficient and paid on an irregular basis.

Evidence suggests that the level and regularity of payment to health workers can affect both the quality and quantity of healthcare provided (Henderson and Tulloch, 2008, Willis-Shattuck et al., 2008, Lu et al., 2005, Hickson et al., 1987). Underpayment and low frequency of payment to health workers is associated with reduced health worker performance (Langenbrunner et al., 2005). This in turn stimulates a proliferation of income sources, as health workers devise alternative "financial coping strategies" increasing opportunities for corruption (Macrae et al., 1996); these include informal payments and predatory mechanisms such as pilfering drugs (Ferrinho et al., 2004,

Mcpake et al., 1999, Akwataghibe et al., 2013, Van Lerberghe et al., 2002). It is also not uncommon for workers to engage in dual-practice, where they may be engaged in health work outside of their main employment. They may even choose to undertake income-generating activities unrelated to healthcare (Ferrinho et al., 2004). Such practices can potentially have negative implications for health care provision (Ferrinho et al., 2004), including high worker absenteeism rates as alternative jobs compete for their time (Alcázar and Andrade, 2001, Jaén and Paravisini, 2001). Donors may further exacerbate the fragmentation in the income received by health workers by providing programme-related performance payments and per diems (Fox et al., 2013).

The multiplicity and fragmentation of income streams has recently been referred to in the literature as the "complex remuneration" of workers (Bertone and Witter, 2015). Within a small sample of African doctors, Roenen et al. identified the receipt of 28 sub-categories of sources of revenue from both medical and non-medical income-generating activities (Roenen et al., 1997), yet little published quantitative data describing this phenomenon is available (Mccoy et al., 2008, Witter et al., 2007, Bertone and Witter, 2015). There is also little conclusive evidence on the effects of these different sources of income on health worker behaviour (Uzochukwu and Onwujekwe, 2005, Ditlopo et al., 2011, Lindkvist, 2013, Stringhini et al., 2009). Yet, examining the incentive environments of health workers in such contexts is especially important given post conflict states tend to suffer from the worst health indicators globally (Bornemisza et al., 2010, Roome et al., 2014) and thus are in great need of improving the quality of health care provided by the workforce. Bertone and Witter (2015) have recommended as an area of further research that a more complete analysis of health worker incomes' in these settings is needed in order to more fully understand health workers incentives' and therefore devise more effective incentive packages.

2.8 Strengthening state systems to remunerate workers

In the immediate post conflict period, the state often requires external financial assistance as its own economy is likely to be unstable with limited ability to rapidly mobilise resources (Roome et al., 2014). Donors therefore play an important role in helping to rebuild health systems (Roome et al., 2014). However, they are often reluctant to invest in strengthening systems, favouring "quick fix" solutions such as

PBF, and differing agendas and priorities can result in a lack of coordination (Tulloch et al., 2011); in Sierra Leone, with respect to donor programming, the early years post conflict were often described as chaotic (Bertone et al., 2014). Governance in post-conflict countries is also weak, with the likelihood of budget support being available to strengthen the system being low, causing a proliferation of vertical programmes[1] and increasing the fragmentation of financing and services (Martineau et al., 2017). Furthermore, an increase in unregulated private sector practice is usually observed given the absence of functioning public sector systems and institutions (Bertone et al., 2018b, Roome et al., 2014). As described in section 2.7 above, this can lead to workers sourcing a multitude of alternative income sources, each of which may influence health worker accountabilities and incentives in different ways resulting in wide-ranging consequences for health worker motivation and performance (Bertone and Witter, 2015). Another feature commonly observed in fragile states is the rapid deterioration of information on human resources for health used to inform the payroll. During the conflict period, a number of workers may have emigrated, died, retired, or changed employment. In a disrupted health sector where health worker information systems are not updated regularly, this leads to a phenomenon known as 'ghost workers', which are employees included in the payroll, but who no longer work at the institution where they are recorded. This results in pay being granted to inactive workers, limiting the government's ability to pay new, active workers. Vested interests prohibit reform of the payroll; for example, corruption has allowed the proliferation of unofficial appointments, and many registered workers are now of retirement age but in the absence of a pension system, continue to receive either a salary and/or risk allowance instead.

Another challenge to rebuilding the system is that the availability of large amounts of aid in the immediate post-conflict period can create a moral hazard, whereby governments are "insured" by donors for their actions and become less likely to pay health workers and transition away from this dependence, thus perpetuating weak leadership and accountability (Bräutigam, 2000, Wagstaff, 2004, Ooms et al., 2007). Donors therefore have a responsibility to work closely with government to create long-term plans for graduating from aid to a situation of sustainable development. Censuses

[1] Vertical programmes are those relating to a single condition or small group of health programmes.

are often viewed as a preliminary step for generating information crucial to making necessary changes in public pay policy. In principle, they are able to distinguish those actually working from fictitious or 'ghost' workers on the staffing list of the relevant Ministry. In some countries, this information can be directly fed into the government payroll and have an immediate impact on the payment of salaries (Goldsmith, 2011, Simson, 2013).

Frequently external resources from donors are channelled into improving Human Resource Information Systems (HRIS) using census data, as opposed to reforming the payroll itself which is more politically sensitive (Goldsmith, 2011). Although HRIS make it possible to improve workforce planning and the processing of payments (Ferrinho and Omar, 2006, Gilson and Erasmus, 2005, Perry, 2008), a recent review identified a lack of research on HRIS implementation and use of the data generated in decision-making over human resources (Riley et al., 2012).

Nonetheless there is little evidence on how poorly functioning public sector wage systems can be strengthened in post conflict states. Most have been documented as case studies (Simson, 2013, Pavignani, 2011, Friedman, 2011), in the grey literature, and so don't seek to systematically identify the different factors which would enable successful replication in another setting.

2.9 Knowledge gaps

In summary, various gaps in the literature have been identified. These include a lack of understanding of the complex financial environment in which health workers operate, particularly in fragile states where the state system to remunerate workers is inadequate and/or dysfunctional. In addition, health worker motivation is being increasingly studied in low- and middle-income countries (Borghi et al., 2017) as it is known to influence the practices and behaviours of health workers (Rowe et al., 2005), however it has not yet been studied in the DRC. Gaining an understanding of the drivers of motivation in post conflict states such as the DRC is particularly important given the challenges faced by workers as well as poor health outcomes experienced by the population in these settings.

The effects of withdrawing certain income sources on motivation has also not been explored in-depth in post-conflict states. This is important given the volatility of external funding relative to domestic sources. In particular, the effects of withdrawing PBF on motivation has been identified as a key area for future research given concerns about sustainability (Suthar et al., 2017, Paul et al., 2018a). Finally, given the state's ability to remunerate its workers influences whether workers actively seek out alternative sources of income and/or if donor financing is required to fill a gap, evidence on successful interventions to improve government payments to workers becomes even more critical.

2.10 Aim and objectives of this thesis

This thesis aims to address each of the knowledge gaps identified above. The main objectives are summarised below:

Objective 1: To describe and quantify the sources and levels of income for health workers in a sample of public sector facilities in the DRC.

Objective 2: To develop and validate a scale to measure dimensions of motivation among health workers in the DRC, and compare differences in motivation among health workers where PBF has recently been removed with those who never received PBF.

Objective 3: To undertake a process evaluation of a complex intervention aimed at facilitating government payments to health workers.

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3. Study Setting

3.1 Introduction

This chapter will begin with a brief overview of the DRC, including its geography, history and how it came to be a fragile state. The status of the population's health, the health system and its workforce will then be described. This is then followed by a detailed description of the two DFID funded health care programmes (ATH and ASSP) within the context of which this research has been undertaken.

3.2 Geography

The DRC, previously known as Zaire, is the second largest country in Africa, with an estimated population of over 78 million (United Nations Department of Economic and Social Affairs, 2017). Located in central Africa, it is bordered by nine countries: the Central African Republic and Southern Republic of Sudan to the north; Uganda, Rwanda, Burundi, and Tanzania to the east; Zambia and Angola to the south; and the Republic of Congo and Atlantic Ocean to the west (see figure 2). Up until late 2015, the DRC was made up of eleven provinces, but has recently been divided into 26 provinces following a decision to implement 'découpage' as foreseen in the 2006 Constitution. Kinshasa is the capital, and the official language is French, although other recognised national languages include Lingala, Kikongo, Tshiluba and Swahili. Just over 40% of the population live in urban areas, almost double the proportion compared to 50 years ago, indicating a trend of increasing urbanisation (Knoema, 2017).

Figure 2: Map of the Democratic Republic of Congo

Source: (Encylopaedia Britannica, 2018).

3.3 A fragile state

A former Belgian colony, the DRC officially gained independence on the 30th of June, 1960. Through a series of shifts in power, Joseph Mobutu became president in 1970, and quickly established a one-party state (Davis and Hayner, 2009). His rule, often referred to as a 'kleptocracy', was characterised by extreme economic exploitation and corruption; he gained significant notoriety internationally for having embezzled billions of dollars' worth of aid, which led the DRC to becoming an almost bankrupt state (Solomon, 1997).

The Rwandan exodus after the genocide in 1994 precipitated the First Congo War (1996–1997) (Ndikumana and Emizet, 2005), which was largely between a Rwandan political faction led by Laurent-Désiré Kabila, and the existing Congolese regime under Mobutu. Mobutu was deposed in 1997, at which point additional African nations entered the Second Congo War, which became the largest war in the history of Africa. Although it officially ended in 2003, the war and its aftermath was estimated to have

caused over five million deaths by 2008 (Moszynski, 2008). Since the formation of a transitional government in 2003, the government has tried to stabilise the country (Vinck et al., 2008), however, active fighting in the country is still prevalent today.

On account of the ongoing conflict and political instability, the DRC has the attributes of a fragile state, which refers to a low-income country characterised by weak state capacity and/or weak state legitimacy leaving citizens vulnerable to a range of shocks (Organisation for Economic Co-Operation and Development, 2006). It is currently seventh on the fragile states index, which ranks countries according to twelve indicator scores pertaining to state vulnerability (Fund for Peace, 2018).

3.4 Health indicators

The DRC has many of the worst health indicators in the world. According to the most recent Demographic Health Survey in 2014, maternal mortality is 846/100,000 live births and the mortality rate for children under five is 104/1000 live births (United States Agency for International Development, 2014). Life expectancy is also very low, with women estimated to live on average 52 years and men 48 years (Population Reference Bureau, 2014). Malaria is the leading cause of mortality and morbidity in the DRC, killing 1.2 million people every year (World Health Organization, 2015b). Ebola, cholera, malaria, and measles outbreaks are endemic. Forty three percent of children under the age of 5 suffer from moderate or severe stunting, as a result of chronic malnutrition (United States Agency for International Development, 2014).

The table below provides some comparison of health indicators across provinces where the research for this thesis has been carried out, and how they compare to the national average. It shows that for the most part, health outcomes were worse in the sampled provinces compared to the DRC average; exceptions were Equateur for rates of stunting in children under five, and Province Orientale and Equateur for rates of anaemia amongst women of reproductive age. However, most provinces had a better than average rate of deliveries taking place in health facilities, apart from Equateur and Kasai Oriental.

Table 1: Core health indicators for provinces where research undertaken compared to national averages

		Sampled provinces				
Health indicator	**National average**	**Kasai Occidental**	**Province Orientale**	**Maniema**	**Equateur**	**Kasai Oriental**
Children under age five who are stunted[2] (%)	43	52	43	46	38	46
Under-five mortality (per 1000 live births)	58	72	69	62	65	63
Women age 15-49 who are anaemic (%)	38	47	37	50	35	41
Births delivered in a health facility (%)	80	84	83	88	60	72

Data source: Demographic Health Survey, DRC, 2013-14

3.5 The health system

The DRC was once renowned in Africa for its network of clinics, quality of physicians, and the organisation of its primary health care (United States Agency for International Development, 2018). However, over the past three decades, the political and economic collapse of the country has led to a dramatic deterioration of the health system; hospitals and clinics lack personnel and equipment, and often run out of critical medicine and supplies (Kalisya et al., 2015).

The following sections briefly describe the organisation of the DRC health system according to the six "building blocks" of health systems as defined by the World Health Organization and illustrated in figure 4 below (World Health Organization, 2007). These include: i) service delivery, ii) leadership/governance, iii) health information systems, iv) access to essential medicines, and v) financing. The final building block, the health workforce, will be considered separately and in more detail as it is the main area of focus of this PhD.

[2] Stunting is a marker of chronic malnutrition, characterised by a child having a low height for their age.

Figure 3: Six building blocks of health systems

Source: (World Health Organization, 2010b).

i) Service delivery

The health system has three levels of administration: the national level which corresponds with the Ministry of Health and defines national health policy; an intermediate level composed of provincial health departments and administrative health districts which is responsible for technical and logistic support; and a peripheral level which is the operational unit providing health care activities (World Health Organization, 2015a).

At the peripheral level, the basic unit of the primary care health system is the health zone. A health zone is a defined geographical area with a population of between 100,000 to 150,000 people, with urban areas more likely to have a higher population density than rural areas (Johnson and Stoskopf, 2010). In theory, each health zone should have a reference hospital providing services in the following fields: general medicine, paediatrics, obstetrics and gynaecology, emergency medicine, and surgery. Hospitals also provide other specialist services such as blood transfusions. Health zones are further divided into health areas which typically serve 10,000 to 15,000 people. According to the Ministry of Health Standards (Ministère De La Santé, 2012), each health area should have a health centre providing an essential minimum package of preventative (e.g. immunisation) and curative (e.g. malaria treatment) primary healthcare activities. Some of the health centres are termed reference health centres, the main difference being that reference health centres are equipped to carry out certain minor surgical operations while health centres are not. Occasionally, if there is no health

centre or reference health centre for a designated health area, there is a health post. Health posts are more similar to health centres but offer mainly curative primary healthcare services. They have often been created to serve populations in remote and less accessible areas (Ministère De La Santé, 2012), and so tend to be manned by fewer staff. The management of health facilities within each zone is overseen by a team of officials in a central health zone office.

Overall, the coverage of basic public services is very limited and piecemeal, with substantial regional and rural/urban disparities (Newbrander et al., 2011). Health facilities are either owned by the state or by not-for-profit private actors (Muyembe et al., 2013). Faith-based organisations are major implementing agencies in the health sector, providing around 50% of health services (Olivier et al., 2015).

ii) Leadership/governance

Weak leadership and poor governance explains much of the decline that has been observed in the health sector in recent years (Weijs et al., 2012). The 2016-2020 Health Development Plan aims to provide a framework for health system reforms to overcome inefficiencies in the sector (Ministère De La Santé, 2016). However, today there remains a large gap between government policies and the reality on the ground. External investments in health from donors which are fragmented and uncoordinated can also sometimes undermine opportunities to build an effective and sustainable system.

iii) Health information systems

The national health information system is known as the Système National d'Informations Sanitaires. However, routine information at the level of the health zone is often collected through a paper-based system, which inhibits the ability to assimilate data in a timely manner for strategic planning, monitoring and evaluation.

iv) Access to essential medicines

The DRC has a national pharmaceutical policy, strategic plan, and essential medicines list. The Système National d'Approvisionnement en Médicaments Essentiels is the essential drug procurement agency and functions as a public-private partnership with support from the international community (Kohler et al., 2012). However, the regulation and supply of essential medicines to the health system remains weak; and, there is still

insufficient participation by development partners, who prefer to use their own supply chains.

v) Financing

With government resources concentrated on the conflict in the East, little progress has been made on maintaining basic services such as primary healthcare (Weijs et al., 2012). The proportion of the national budget allocated to health is very low; in 2013, public investment in health was only 4.5% of the national budget falling far short of the Abuja commitment of 15% (Secrétariat Général, 2013). The budget execution rate was also low, averaging only 50% between 2001 and 2011 (Ministère De La Santé, 2013). However, there are positive signs of health becoming more of a priority, with the allocation of the budget to health reportedly having increased to 8.6% in 2015 (United States Agency for International Development, 2016).

Despite increases in budgetary allocations to health, providers still rely heavily on a system of cost recovery through user fees, which are prohibitive to the majority of the population who live in extreme poverty. While external assistance was the leading source of health financing between 2008 and 2013 and accounted for 40% of total health expenditure, out-of-pocket payments are the second largest at 39%, with less than 15% coming from the government (Barroy et al., 2018).

A system of reverse financial flows – sometimes referred to as "financement ascendant" or "la pompe" (Fox et al., 2013, Bertone et al., 2016) - has therefore developed whereby part of the user fees collected by health facilities is channelled to the district offices and from there to the intermediate and national administrative and governance levels (World Health Organization, 2015a). This practice has been declared illegal by the Ministry of Public Health, as the funds are only meant to be distributed amongst workers at facilities (Bertone et al., 2016). Furthermore, the system of user fee payments remains unregulated, with no accepted national tariff for consultations allowing facilities to have autonomy over the setting of tariffs.

As described in chapter 1, section 1.4, donors have been providing workers with financial incentives, most notably in the form of PBF. There are several bilateral and multilateral donors in the DRC health sector; important agencies include: DFID, the

United States Agency for International Development, the World Bank, the European Union, the Global Fund, and Global Alliance for Vaccination and Immunisation (World Health Organization, 2015a). However, the provision of financial incentives is poorly coordinated amongst the donor community, and approaches used are often inconsistent (Fox et al., 2013). Figure 4 illustrates the plethora of donors operating in health in the 26 provinces of the DRC.

Figure 4: Map of donor programming in health in DRC (2017)

Efforts have been attempted to encourage donor alignment. For example, in 2014, the Ministry of Health was requested to establish a harmonised system amongst donors for paying incentives. When this condition was not met, the Global Fund froze its incentive payments to workers, however these were reinstated only months later as it was risking the implementation of projects (Aidspan, 2016).

3.6 The health workforce

There is known to be great provincial variation in terms of poverty and the availability of staff and health services between the DRC provinces as illustrated in table 1, with the nursing cadre making up the majority of health workers in state health facilities. The

World Health Organisation recommends 23 doctors, nurses and midwives per 10,000 population to achieve sufficient coverage of primary healthcare needs (World Health Organization, 2006). However, none of the sampled provinces or the national average meets this criterion in the DRC.

Table 2: Incidence of poverty, health facility staffing and availability of facilities

		Sampled provinces				
Indicator	**National average**	**Kasai Occidental**	**Province Orientale**	**Maniema**	**Equateur**	**Kasai Oriental**
Poverty incidence*	70.27%	55.8%	75.5%	58.5%	93.6%	62.3%
State facilities/ 10,000 population†	3.25	4.18	3.07	3.53	1.78	3.37
Nurses/ 10,000 population‡	11.31	11.59	7.15	11.35	4.21	9.83
Doctors/ 10,000 population	1.54	0.50	0.56	0.97	0.17	0.50
Pharmacists/ 10,000 Population	0.10	0.02	0.02	0.02	0.01	0.00
Laboratory workers/ 10,000 Population	0.43	0.13	0.10	0.07	0.04	0.29

*Poverty defined as living on less than 1 United States Dollar (USD) per day
†Information for state health facilities only (primary and secondary)
‡The category of nurses includes midwives
Data sources: (Direction Des Services Generaux Et Ressources Humaines, 2013, United Nations Development Programme, 2009a)

Another key challenge relates to the payment of health workers, which is complex and fragmented. In the DRC, salaries for health workers were nominal following the economic crisis and conflicts during the 1990s, so in order to increase wages, occupational risk allowances or "primes de risque" were introduced (Verheijen and Mulumba, 2008). Occupational risk allowances are allocated to workers delivering clinical services, as they may be exposed to certain health risks (e.g. infectious diseases such as Ebola). The occupational risk allowances are managed by the Ministry of Health while salaries are controlled by the Ministry of Public Sector Reform. This system of dual payment has led to much confusion amongst health workers around what they should receive from the government, and has important implications for health worker

motivation and performance (Agyepong et al., 2004, Ferrinho et al., 2004, Mccoy et al., 2008).

Few public sector health workers currently receive any government payments because of out of date payrolls and widespread corruption (Fox et al., 2013, World Bank, 2008). Part of the problem is due to new workers not being registered onto the payroll which is plagued by "ghost workers", a phenomenon common to post-conflict states and described in chapter 2 (World Bank, 2008). Many workers have therefore either gone private, emigrated or become an employee of one of the international non-governmental organisations (NGOs) providing health care support (Murru and Pavignani, 2012).

3.7 DFID health programmes in the DRC of relevance to the thesis

This research was carried out within the context of two DFID funded health care programmes, which sought to tackle the remuneration of health workers among other initiatives to strengthen the health system. Outlined below is a brief description of these two programmes and the context of their implementation. Firstly, how both programmes affected the use of PBF and other health worker income sources are described. Secondly, an intervention within the second programme seeking to improve the government system for health worker remuneration is described. Finally, more depth on the social, cultural and economic contexts of each sampled province is provided as well as a brief description of the characteristics of the study facilities.

Programmes affecting health facility financing

3.7.1 Introducing PBF: The Access to Healthcare Programme 2008-2013

Between 2008 and March 2013, DFID provided funding towards a health systems strengthening programme called access to healthcare (ATH) in the DRC. ATH was implemented by International Rescue Committee and Medical Emergency Relief International, and supported health centres and hospitals to deliver a package of basic primary health services (which included both preventative and curative services) in 20 health zones in the provinces of Kasai Occidental, Province Orientale, Maniema, and South Kivu, reaching approximately two and a half million inhabitants (Department for International Development, 2008). The interventions of ATH included: heavily

subsidising user fees in order to encourage uptake of services; training health workers; constructing and rehabilitating facilities; and providing free drugs and medical equipment to facilities. Fixed amounts of money were also paid to health facilities each month to cover running costs. In an effort to improve retain and motivate health workers within facilities, DFID also introduced a PBF scheme, as few workers were consistently receiving any payment from the state. A fixed amount of 75 United States Dollars (USD) was provided to workers each month based on their attendance at health facilities, while an additional performance-based payment of 25 USD was allocated to workers if their facility attained a minimum score at its quarterly performance review. The criteria used to calculate this facility-based score are given in appendix 1.[3] Verification checks were carried out in facilities by the implementing partners to ensure reporting was robust.

3.7.2 Removing PBF: Accès Aux Soins de Santé Primaire programme, 2013 onwards

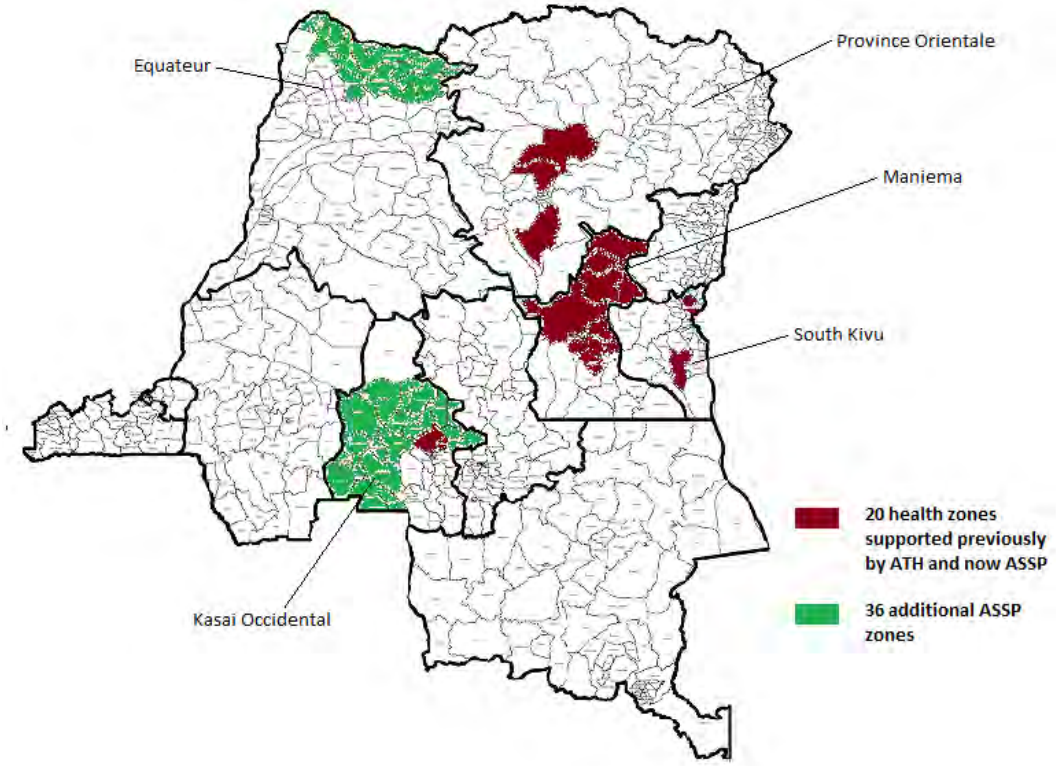
Following the end of ATH in March 2013, DFID commenced a follow-on health systems strengthening programme called Accès Aux Soins de Santé Primaire (access to primary healthcare or ASSP) (Department for International Development, 2012). The NGO Interchurch Medical Assistance (IMA) was appointed as the lead implementing partner of this programme, and sub-contracted other NGO partners Caritas, World Vision and Santé Rurale to help implement the programme. ASSP continues to support many of the same interventions in the 20 health zones of ATH, namely: the treatment of infectious diseases, nutrition, obstetric and neonatal care; family planning; immunization; and water, hygiene and sanitation. It also extended support to a further 36 health zones, including eleven zones in the province of Equateur and 25 zones in the province of Kasai Occidental (figure 5). In total, 56 health zones are now receiving support from ASSP, representing a population of almost 9 million. In addition, ASSP targeted zones where few other donors are implementing vertical or horizontal health initiatives.

[3] As one of the objectives of this PhD is to examine the effects of removing this payment on the motivation of health workers, the criteria for the facility-based score has been provided in appendix 1.

However, unlike ATH, ASSP does not include a PBF scheme. During the first year of ASSP, PBF (both the supplemental fixed payment and performance payment) to health workers was gradually phased out in the 20 health zones of the previous ATH programme, with all performance payments having ceased by March 2014.

The approach to user fees in the ASSP programme was also different compared to ATH. On account of the removal of performance-based payments, user fees were no longer subsidised within previous ATH health zones. New user fee tariffs in all ASSP zones were decided locally by health providers and beneficiary committees with the help of health zone and provincial health authorities. More detail on these two programmes is provided in research paper 3 within chapter 6.

Figure 5: Health zones covered by ATH and ASSP



Addressing national level systems for paying workers

3.7.3 Intervention within ASSP to improve systems for paying workers

In order to work on a sustainable approach to financing health workers, with DFID funding, IMA also piloted a human resources intervention in all of Kasai Occidental[4] in an effort to facilitate government payments to health workers. IMA sub-contracted the technical partner IntraHealth to assist with the implementation of this pilot intervention.

Broadly, the intervention involved two components. The first component involved undertaking a census of health workers, where information on legitimate workers would be recorded onto a Human Resources Information System (HRIS). This information would then be compared with the list of workers on the staff payroll and who are receiving a government occupational risk allowance. Following approval of the relevant Ministries, the information from the census would be used to update the lists with more accurate information on legitimate versus illegitimate workers. The salaries and risk allowances of several "ghost" workers would be reallocated to workers who should be receiving them.

The second component involved assessing the staffing needs of health facilities using the Workload Indicator of Staffing Needs methodology (World Health Organization, 2010a), in order to update guidelines from 2006 (Ministère De La Santé, 2006) on the normal numbers of staff required per facility. More detail on these components, which are the subject of a process evaluation within this thesis is provided in chapter 7.

3.7.4 Social, cultural and economic contexts of sampled provinces

Kasai Occidental

Kasai Occidental is a land-locked province sharing a border with four other Congolese provinces: Bandundu to the west, Equateur to the north, Kasai Oriental to the east and Katanga to the southeast. It also shares an international border with Angola to its south. Kasai Occidental has two districts, Kasai and Lulua. Five million people live in this province, and the population density is the same as Kasai Oriental at approximately 28

[4] Kasai Occidental became subsequently known as Kasai and Kasai central following découpage on July 16 2015

inhabitants per km^2, which is the highest compared to the rest of the sampled provinces. Over half of the population is aged 15 years and under. The majority of the population is from the Lulua tribe who exclusively speak Tshiluba. The rest of the population is divided up amongst a dozen smaller ethnic groups with their own native language in addition to Tshiluba (United Nations Development Programme, 2009b).

Although Kasai Occidental is rich in natural resources such as diamonds and gold, only a few companies control industrial concessions, while the majority of mining practised in the region is artisanal. Agriculture is practised by 77% of the population, yet most of this is subsistence farming with little investment in mechanised agriculture (United Nations Development Programme, 2009b). Rates of unemployment are high, with few job opportunities for educated young people. There are few vocational jobs aside from those within institutes and government offices in the main towns, and very few private sector businesses exist. The majority of households do not have electricity and only 7% have access to safe drinking water, while over a quarter do not have a toilet (United Nations Development Programme, 2009b).

Province Orientale

Province Orientale lies in the northeast of the country. It borders Equateur to the west, Kasai Oriental province to the southwest, Maniema to the south, and North Kivu to the southeast. It also borders the Central African Republic and South Sudan to the north, and Uganda to the east. The provincial capital is Kisangani. It has a population of over 8 million and population density of 16 habitants per km^2 (United Nations Development Programme, 2009c).

Compared to most other provinces, there is a fair degrees of heterogeneity in ethnic groups; with dominant ethnic groups smaller than elsewhere the province tends to attract domestic migrants to their relative economic opportunities (Secure Livelihoods Research Consortium, 2018).

Since 2008, the north-eastern regions in Province Orientale, which lies in the northeast of the country, have been facing a guerrilla war of the Lord's Resistance Army. This militia has killed more than 2,300 people and abducted more than 3,000 into slavery or forced recruitment (United Nations Refugee Agency, 2010). Even before the invasion of

the Lord's Resistance Army, this province was among the least developed parts of the country. Basic infrastructure such as road networks, electricity supply, communication network coverage, and access to essential services such as health centres and hospitals are poor (Zarocostas, 2009). Less than 2% of the population have access to electricity or tap water (United Nations Development Programme, 2009c). However, the capital Kisangi is strategically placed at the junction of the Congo, Tshopo and Lindi rivers, making it the country's major inland port after Kinshasa. The city is today an important centre of commerce, finance, industry, metallurgy, panning, real estate, hydro industries, agriculture, breweries, technology, culture, media, and arts.

Maniema

Maniema borders the provinces of Kasai Oriental to the west, Province Orientale to the north, North Kivu and South Kivu to the east, and Katanga to the south. Similar to Province Orientale, Maniema is sparsely populated compared to most other provinces; approximately two million people live in Maniema with a population density estimated to be 15 habitants per km^2 (United Nations Development Programme, 2009d).

Maniema is populated only by the Bantu tribe which is composed of three ethnic groups according to anthropologists and historians (Congovirtual, 2020). Languages spoken include Tshiluba and Swahili.

Agriculture remains the main activity of the province. Despite favourable conditions for diverse production, the population mainly cultivates staple foods like rice, plantain, corn and cassava using subsistence practices. The province also has important mineral potential, ranking fourth in position after Katanga, Province Orientale and Kasai Oriental provinces. Mineral resources include gold, diamond, cassiterite, coltan, malachite, iron, lead, manganese, platinum, and silver.

Health indicators are better compared to most other provinces as shown in table 1. However, only 1.8% of households are connected to electricity compared to the national average of over 10% (United Nations Development Programme, 2009d).

Equateur

Equateur is land-locked, but shares a border with three other Congolese provinces: Bandundu to the south, Kasai Occidental to the southeast, and Province Orientale to the east. It also shares two international borders with Central African Republic to the north and Republic of Congo to the west. Equateur is the third-largest province in terms of surface area in the DRC; as such, it is sub-divided into five districts: Equateur, Tshuapa, Mongala, Sud-Ubangi, and Nord-Ubangi. The population of Equateur is similar to Kasai Occidental and is estimated at 5.8 million inhabitants but with a lower population density of 14 inhabitants per km^2, well below the national average (United Nations Development Programme, 2009e). Again, a large proportion of the population is young; in 2005, more than half of Equateur's population was under the age of 20 years (United Nations Development Programme, 2009e). The principal ethnic groups are the Bangala in the north, most of which are comprised of tribes which migrated centuries earlier from Chad and Sudan, and the Mongo and pygmies in the south (United Nations Development Programme, 2009e).

The local economy in Equateur is comparable to Kasai Occidental; 76% of employment is in subsistence agriculture. The second greatest source of employment is the informal retail sector (16%) (United Nations Development Programme, 2009e) and there is minimal formal employment or private sector development.

In Equateur, the last known poverty rate was 93.6% making Equateur the poorest province in the DRC .Only 1% of households enjoy access to electricity, and 6% have access to safe drinking water (United Nations Development Programme, 2009e).

Kasai Oriental

Kasai Oriental borders the provinces of Kasai Occidental to the west, Equateur to the northwest, Orientale to the northeast, Maniema to the east, and Katanga to the south. Kasaï-Oriental is one of the richest diamond producing regions in the world. The provincial capital is Mbuji-Mayi and the province is inhabited by members of the Luba tribe.

Diamonds are the main resource mined in the province but production has reduced in recent years. Agriculture remains the principal activity but is often subsistence; there are

some industrial crops such as coffee and cotton but their production is poorly developed and has little significant impact on the economy of the province or household income. Similar to the other sampled provinces, less than 1% of households have access to electricity and over 27% drinking water from unprotected water sources (United Nations Development Programme, 2009f) i.e. sources with no barrier or other structure to protect the water from contamination.

3.7.5 ATH facilities versus ASSP new/control facilities

Some of the facilities sampled in the study included previous ATH facilities as well as new ASSP or non-ASSP health centre facilities. The ATH facilities usually had a superior infrastructure and were better resourced than the new ASSP or non-ASSP facilities on account of the rehabilitation which had taken place under previous DFID support. For example, they were more likely to have an electricity supply due to the provision of solar panels under the ATH programme. In contrast, other facilities sampled in the study tended to lack an electricity supply and buildings were generally very dilapidated. The photographs below provide a visual example of an ATH facility compared to a new ASSP facility sampled in the study.

Photographs of the exterior and interior of an ATH facility

Photographs of the exterior and interior of a new ASSP facility

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PART II: METHODS

4. Methods

4.1 Introduction

This chapter describes the methods used to address the aim and objectives of this thesis as set out in chapters 1 and 2. Table 3 provides an overview of which methods were used to achieve each objective, and the corresponding papers. The rationale behind the choice of method used for each objective is discussed and then followed by a description of methods of sampling, data collection, analysis and timelines for the different studies. Finally, a conceptual framework clarifying what is being evaluated and how different programme interventions may influence motivation is presented.

Table 3: Objectives, methods and results papers

Objective	Methods	Papers (context, methods and results outputs)
1. To describe and quantify the sources and levels of income for health workers in a sample of public sector facilities in the DRC.	Qualitative interviews with nurses. Health worker and health facility survey.	**Research Paper 1:** Maini R, Hotchkiss D, Borghi J. A cross-sectional study of the income sources of workers in the Democratic Republic of Congo. 2017. **Status:** Published in Human Resources for Health. **Chapter:** 5
2. To develop and validate a scale to measure dimensions of motivation among health workers in the DRC, and compare differences in motivation among health workers where PBF has recently been removed with those who never received PBF.	Qualitative interviews with nurses. Health worker and health facility survey.	**Research Paper 2:** Measuring the motivation of health workers: an analysis of methodological issues and lessons learnt **Status:** Submitted to Human Resources for Health. **Chapter:** 6 **Research Paper 3:** What Happens When Donors Pull Out? Examining differences in motivation between health workers who recently had performance-based financing (PBF) withdrawn with workers who never received PBF in the Democratic Republic of Congo **Status:** Published in International Journal of Health Policy and Management **Chapter:** 6
3. To undertake a process evaluation of a complex intervention aimed at facilitating government payments to health workers.	Qualitative interviews with key stakeholders. Theory of change workshops. Document review.	**Research Paper 4:** Maini R, Mounier-Jack S, Borghi J. How to and how not to develop a theory of change for a complex intervention: reflections on an experience in the Democratic Republic of Congo. 2018. **Status:** Published in BMJ[5] Global Health. **Chapter:** 7 **Research Paper 5:** Performance-based financing versus improving salary payments to workers: insights from the Democratic Republic of Congo. 2018. **Status:** Published in BMJ Global Health. **Chapter:** 7 **Research Paper 6:** A process evaluation of a complex health systems intervention to improve the payment and distribution of health workers: the need for systems thinking and an adaptive, politically-informed approach **Status:** Submitted to Implementation Science. **Chapter:** 7

[5] BMJ refers to the British Medical Journal family of publications

4.2 Rationale for study methods

4.2.1 Choice of method for objective 1

In this study, we used a health worker and health facility survey to obtain data on different sources of income and their amounts as both surveys were being undertaken as part of a larger baseline evaluation of the ASSP programme. Survey data were complemented by a series of qualitative interviews with health workers carried out by myself and a local researcher, and are described in more detail in section 4.4 below. Direct questioning was employed, however, measuring the remuneration of health workers can be challenging as certain sources of income may be sensitive, particularly informal revenues. It can therefore be difficult to obtain truthful responses. Alternative methods which could have been employed are discussed in detail below.

A way of allowing respondents to answer sensitive questions truthfully is the Randomised Response Technique (RRT) (Londino and Waung, 2004). It uses a randomization device, such as a coin flip, but the interviewer is blinded to the outcome. For example, the respondent may answer "yes" regardless of the truth if the coin comes up tails, and truthfully, if it comes up heads. By introducing random noise, this method helps to conceal an individual's responses from the interviewer, thereby protecting their privacy (Blair et al., 2015). However, the RRT is less efficient than direct questioning as estimates need to be drawn from a large sample in order to maintain statistical power, and designs are also complex to administer (Lensvelt-Mulders et al., 2005). Another technique designed to overcome the high levels of non-response associated with sensitive income questions is by using income "brackets" (Paulin, 2003). With this method, respondents are given the opportunity to provide an income range when they are unable or unwilling to give a specific value. The "unfolding" bracket technique asks respondents a series of yes/no questions designed to narrow down the respondent's income range (Schwartz and Paulin, 2000). For example, a respondent may be asked: "Is your salary greater than $20,000/year?". If the answer is positive, the interviewer may then ask: "Was it greater than $30,000?". The conventional bracketing technique differs in that respondents are presented with a number of predetermined data ranges upfront. However, a limitation of the bracketing technique is that it leads to a loss of precision. Furthermore, the choice of starting values in unfolding brackets sequences

can lead to “anchoring bias” (Winter, 2002); which is when respondents think their answer should be closer to the presented starting value than they would have said had they not seen the anchor. Other studies have also found that a mixed method approach is useful in better understanding the level of each income and the perceptions and views of health workers on their different revenues (Akwataghibe et al., 2013, Mcpake et al., 1999).

Although RRT and bracketing would have helped to limit social desirability bias of responses in the health worker survey, the sample size requirements for analysis would not be adequate and complexity of administration meant that direct questioning would be easier to implement.

4.2.2 Choice of method for objective 2

Motivation is an internal psychological process which cannot be directly observed (Pinder, 2008). Measuring motivation can therefore be challenging, and as yet there is no “gold standard” method or approach.

For this study, a mixed methods triangulation design to collecting data through a quantitative survey and qualitative interviews was selected in order to directly inquire about health worker motivation. Both methods, including the design and data collection and analysis methods are outlined in detail in section 4.4. Principles and approaches to measuring motivation as well as alternative methods to those used in this thesis are presented below.

Irrespective of the method chosen, the first step is to conceptualise motivation, and there is an abundance of motivation theories to inform this as described in chapter 2. The choice of approach taken will be influenced by the research question (Borghi et al., 2017). For instance, where the focus may be on measuring overall motivation, a unidimensional conceptualisation of motivation may be preferred; on the other hand, if the focus is on understanding the composition of motivation i.e. the different dimensions which may contribute to overall motivation, it may be conceptualised as being multidimensional. For this objective, the Franco framework of motivation (as described in chapter 2) was applied which identifies a range of motivational

determinants and consequences at the individual, organisational and societal level (Franco et al., 2002).

Once a clearly defined conceptual framework for motivation has been selected, it can then inform the design of tools with which to measure motivation. Usually, either direct or indirect methods are applied (Borghi et al., 2017). Direct methods attempt to measure motivation itself, while indirect methods aim to measure those aspects which are affected by motivation. Surveys and qualitative methods can be used to measure motivation either directly or indirectly. Other indirect methods include experimental games (Camerer et al., 2011) and observations of behaviour (Leonard and Masatu, 2010).

An advantage of using surveys to measure motivation is that they can cover a large number of respondents compared to in-depth interviews alone, thus making conclusions more generalisable. In addition, surveys permit systematic and standardised comparisons. On the other hand, qualitative data provide rich, in-depth detail which cannot be captured by quantitative data. Therefore, more insights can be gained by combining quantitative and qualitative methods to provide a more expanded understanding of the issue under investigation (Creswell and Creswell, 2017). Nonetheless, both methods rely on self-report by respondents and such measures are subject to several errors, including response bias (Coolican, 2004) and attribution error (Kelley and Michela, 1980).

Behavioural measures are often desirable as they enable researchers to quantify what workers do (Kanfer, 1990). However, a limitation of such measures is that motivation is often only a partial determinant of job performance (Kanfer et al., 1999). Specifically, motivation affects aspects of performance that can be brought under the worker's personal command. For example, if facilities are poorly resourced, workers may be limited in their ability to accomplish their job for reasons beyond their control. Direct observation of health worker performance is also not practical on a large scale as data is time-consuming and resource-intensive to collect. Moreover, health workers may change their behaviour when they are being monitored (the Hawthorne effect) (Wickström and Bendix, 2000).

4.2.3 Choice of evaluation method for objective 3

The last objective of this PhD was to undertake a process evaluation of a complex intervention aimed at facilitating government payments to health workers. Complex interventions are those which tend to have multiple components which act both independently and in conjunction with one another (Craig et al., 2008). A theory of change approach to the evaluation was chosen to understand whether implementation of the intervention occurred as intended and any factors affecting implementation, in order to better inform how the intervention may be replicated in other settings. This was achieved through: theory of change workshops, qualitative interviews with key stakeholders, and document reviews. The rationale for choosing this particular approach is expanded on below.

In the past, evaluations of complex interventions have mainly assessed progress on achieving stated outcomes or impacts. In particular, randomised controlled trials have been regarded as a robust evaluation design for establishing the effectiveness of complex interventions (Moore et al., 2015, Campbell et al., 2000). However, this "black box" approach fails to explain how and why the intervention had certain effects, and limits understanding on how to successfully replicate it in a different setting (Pawson et al., 2005, Stame, 2004, Bonell et al., 2012).

Process evaluations, on the other hand, determine the extent to which an intervention is implemented as intended (Carroll et al., 2007, Adam et al., 2012, Oakley et al., 2006b, Rychetnik et al., 2002). In so doing, they can distinguish between problems with interventions where the theory underpinning the intervention is incorrect (concept failure), or the implementation of the intervention is poor (implementation failure) (Oakley et al., 2006a). Early indication of such issues permits investigators to adapt the intervention as necessary, thus potentially limiting a waste of resources as well as increasing chances of intervention success (Hawe et al., 2004).

Theory-based process evaluations start by clarifying the 'programme theory', which is how programme activities are understood to cause (or contribute to) outcomes and impacts. Two common types of theory-based evaluations are theories of change and realist evaluations (Pawson and Tilley, 1997).

The theory of change method is often used by the international development community to articulate the sequence of events linking activities, outcomes and context of an intervention (Green, 2000). It also explores the conditions and assumptions needed for the change to take place (Connell and Kubisch, 1998). It is best to develop the theory of change with other stakeholders in order to build consensus, as they often have different ideas on how an intervention should work (Weiss, 1995). Identifying the agendas, perspectives and influences of key individuals or groups through a stakeholder analysis can also yield valuable information on how stakeholders perceive the intervention and how their actions may moderate it (Brugha and Varvasovszky, 2000). The systematic documentation of the contextual environment is key as certain events may influence implementation (Adam et al., 2012); for instance, changes in political appointments may affect government buy-in and the effectiveness of implementation which could affect its impact.

Realist evaluations are most appropriate for evaluating programmes that seem to work but the "where" and "for whom" is not well understood (Pawson and Manzano-Santaella, 2012), and so assume that context makes a significant difference to programme outcomes. The approach differs from theory of change evaluations in that the theory is articulated through general conversations and interviews with a selection of stakeholders (Blamey and Mackenzie, 2007). It is often applied when evaluating programmes that have previously demonstrated mixed evidence of effectiveness, in order to understand how and why differences occur (Westhorp, 2014).

Both theory of change and realist evaluations are concerned with understanding the theory of an initiative. Each approach requires that the intervention's theory be used to inform the evaluation's purpose and focus, and the key questions that it will address. To date, complex health systems interventions aimed at improving government payments to health workers have only been reported in the form of case studies (Goldsmith, 2011, Simson, 2013). Therefore, given there was little robust evidence on the effectiveness of this type of intervention, a theory of change approach was selected as the preferred evaluation method.

4.3 Epistemological approach to in-depth interviews

Semi-structured, in-depth interviews were undertaken for each objective as they allow for an in-depth exploration of pre-defined topics (Green and Thorogood, 2013). The flexible nature of interviews also allowed the discussion of any new ideas or issues, whilst still ensuring that each interview covered comparable topics under each objective (Bernard, 2017).

There are several different philosophical approaches to qualitative inquiry. Being clear about my own epistemological approach was important in understanding how the knowledge for the research undertaken for this thesis was produced. The underlying philosophy of the qualitative approach adopted in this thesis was that of "subtle realism". Subtle realism is an important epistemological perspective within health care research (Duncan and Nicol, 2004). It posits that all theories about the world are grounded in a particular perspective and worldview, and all knowledge is partial and incomplete. However, it assumes there is an underlying reality that can be studied – a view which is rejected by anti-realists (Ayer, 1988).

In essence, 'subtle realism' approaches attempt to represent reality from our perspective of it, rather than to attain 'the truth' (Mays and Pope, 2000). I acknowledge that in attempting to understand the remuneration and motivation of workers, there was a reliance on the participants' own accounts of their practices, and the knowledge generated reflected the dynamic of the interview setting and both my characteristics and those of my research assistant's. Consequently, reflexivity - where the role and perspective of the researcher in the research process is acknowledged – was considered throughout data collection and analysis (Primeau, 2003). More detail on how this was undertaken is provided under section 4.4.2 on qualitative data collection and analysis.

4.4 Design, collection and analysis of data for objectives 1 and 2

The design, collection and analysis of quantitative data for objectives 1 and 2 are described together in the following section, as the sources of data for these objectives were the same.

Although quantitative data collection preceded qualitative data collection for objectives 1 and 2, the overall design strategy used was concurrent triangulation, with mixing of methods occurring at the interpretive stage. Both quantitative and qualitative data were used to confirm or corroborate findings.

4.4.1 Quantitative data for objectives 1 and 2

Design of data collection tools

The quantitative data for objectives 1 and 2 were derived from questions incorporated in health worker and health facility surveys. I helped to design and finalise both questionnaires which are included in appendices 2 and 3. These surveys were being conducted as part of a larger impact evaluation (before and after study) of the ASSP programme, which was measuring the programme's effects on healthcare utilisation and health outcomes. Objectives 1 and 2 draw on the baseline study of this impact evaluation before ASSP was implemented.

Objective 1: Questions on remuneration within the health worker survey were adapted from the Health Worker Incentive Survey, which was developed to collect data on health workers' remuneration in Ghana, Indonesia and Burkina Faso (Ensor and Witter, 2007). The survey identified income sources received and income levels for government payments (salaries, occupational risk allowances), performance payments and per diems from non-governmental partners, private clinical work, user fees from patients, informal payments,[6] or "gifts", allowances, and income from non-clinical activities. Workers were also asked whether government payments were received on time, if there were delays receiving these payments, and amounts received compared to expectations. Income levels were recorded in Congolese Francs. Recall was for "last month received" for all incomes with the exception of per diems which was for the "last year".

Objective 2: 47 questions on motivation within the health worker survey had already been selected by the principal investigators of the evaluation based on previous surveys they had been involved in which were conducted in other countries (Khan et al., 2013, Banteyerga et al., 2010, Hansen et al., 2008). These questions were grounded in the

[6] Informal payments are defined as payments made by patients which are outside of official channels

Franco conceptual framework of motivation described in chapter 2, (Franco et al., 2002, Franco et al., 2004) given its extensive use in other low- and middle-income countries. Answers were to be provided on a five-point response scale ranging from strongly disagree to strongly agree.

A month prior to finalisation of the survey, I had the opportunity to review, modify and add questions to the tool as needed. A rapid review of the motivation literature was undertaken and further questions which were relevant to the Franco framework selected. In order to ensure questions were relevant to the context, all questions relating to motivation were discussed with partners implementing ASSP. Eleven additional questions were eventually added so as not to overburden the survey, making a total of 58 questions. A not applicable option was also added to the Likert scale for certain questions which may not have applied to all workers, in order to mitigate against any missing responses. A list of questions and the final dimensions relating to the Franco framework used in the survey can be found within the research paper in chapter 6 and appendix 2.

Relevant to both objectives were a set of explanatory variables key to understanding the determinants of income and motivation measured within the health worker and health facility surveys. Appendix 1 of research paper 1 and supplementary file 3 of research paper 3 refer to the global evidence which led to the selection of these explanatory variables, which included demographic data from health workers and certain characteristics of health facilities. Demographic data from the health worker survey included: age, sex, cadre, marital status, educational attainment, number of years in current position, and number of financial dependents. From the health facility survey, relevant explanatory variables included: provincial location, urban-rural status, the total number of staff present on the day, facility type, distance of the facility from the village, and the number of primary healthcare services provided. A unique facility identifier also enabled linking of the health worker survey to the health facility survey. With respect to objective 2, facility exposure to PBF was also measured as the motivation of workers who had experienced PBF withdrawal was going to be compared with workers who had never received PBF; in other words, those who had been working in ATH areas prior to ASSP constituted a previous PBF group, while workers who had not been covered by the ATH programme constituted the non-PBF group.

Pre-testing of Tools

Tulane University subcontracted the Kinshasa School of Public Health (KSPH) to conduct the pre-test of tools, carry out training, supervise facility and health worker data collection and enter the data for the baseline evaluation of ASSP.

Once the survey questions had been finalised, the tool was translated into French and a pre-test of the entire health worker and health facility survey was conducted over 4 days by the KSPH team with heads of facilities and health workers in two non-study primary healthcare facilities nearby in Kinshasa and Bas-Congo. The purpose of the pre-test was to identify questionnaire problems, assess non-response rates, test the consent form and estimate the length of time to administer the survey. Following the pre-test, only minor changes to the phrasing of two motivation questions within the health worker survey were made to make them clearer to respondents. The only changes made to the health facility survey was modifying the ordering of questions, so that questions relating to infrastructure which required an assessment against an inventory were addressed last.

Sampling of health facilities and health workers

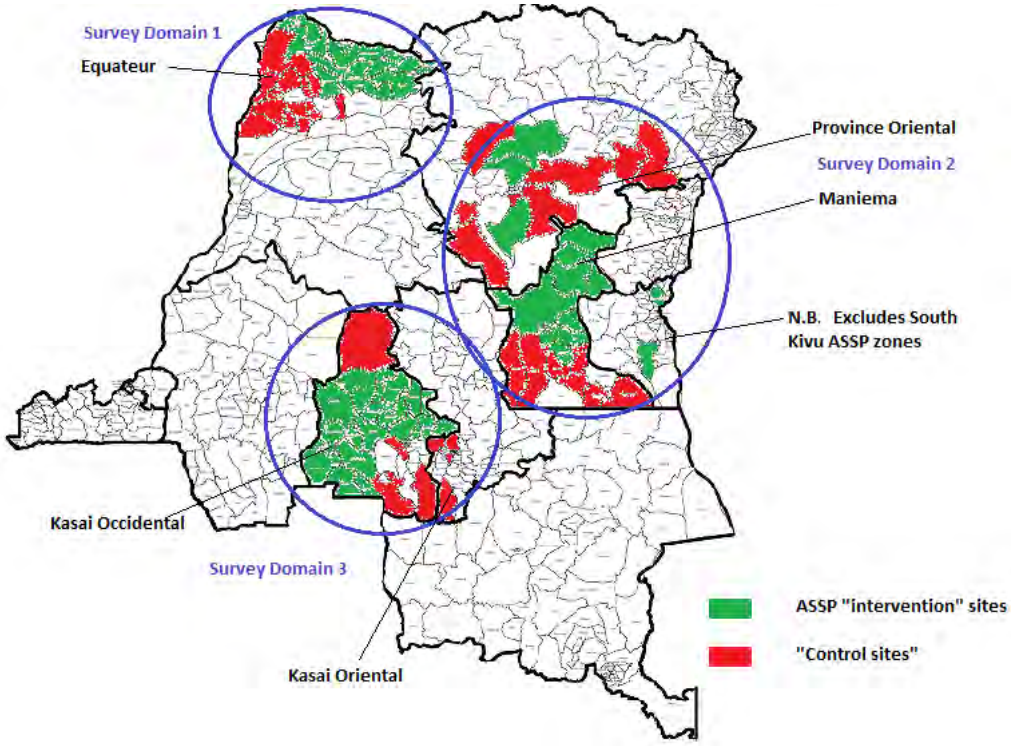
The sampling frame included all facilities in provinces covered by ASSP with the exception of South Kivu, as the programme was in the process of exiting this province (figure 6). Three survey domains were defined: Province Orientale and Maniema were combined to make one survey domain, Kasai Occidental and Kasai Oriental was another, and Equateur constituted its own survey domain. It was more efficient to combine certain provinces into one domain on account of the way health zones were clustered under ASSP.

The sample size for the health facility survey was derived from the household survey sampling approach for the ASSP evaluation. Therefore, no specific sample size calculation was carried out for the facility or health worker survey as main outcomes for the evaluation were being measured within the household survey. The first step within each survey domain was to use probability proportional to size to sample villages in areas supported by ASSP, also known as “intervention” sites. “Control” sites where ASSP was not operating, were then matched with intervention sites by geographic location (urban/rural and provincial location) and village population size. The health

facility officially designated to serve households for a selected village was then chosen for the facility survey.

For each survey domain, data were collected from 35 ASSP-supported facilities (intervention sites) and 35 facilities where ASSP was not operating (control sites). Therefore, in total 210 health facilities were sampled. The inclusion criteria for facilities were those which were public primary care facilities; secondary care or private health facilities were excluded. For the health facility survey, the head of the facility was interviewed on the day of the survey. All health workers on duty in a selected health facility on the day of the survey were interviewed using the health worker survey.

Figure 6: Survey domains for ASSP impact evaluation



Training and data collection

Twelve data supervisors were first recruited, many of whom had recently worked on the last Demographic Health Survey and so were well versed in undertaking large-scale

surveys. They were trained over 7 days in Kinshasa by the study coordination team from Tulane University and the KSPH.

A total of 121 data collectors were then hired; all of them came from each of the provinces to be sampled in order to ensure familiarity with the cultural context. Again, priority was given to data collectors who had been involved in the recent Demographic Health Survey while remaining data collectors were recruited based on their previous experience of working on KSPH data collection projects. Given the large geographical areas to be covered by the surveys, training of 11 days duration was conducted concurrently across four different sites by data supervisors as well as members from Tulane University and the KSPH. In order to ensure consistency, the same training materials, presentations and exercises were used in each site. I helped to oversee the training of data collectors in Equateur province.

During April to May 2014, the health worker and health facility surveys were conducted within each of the three survey domains described above (appendices 2 and 3 respectively). Consent was obtained from all participants prior to undertaking each survey using the consent form in appendix 4, and interviews were conducted in a private room of the facility or outside to maintain confidentiality. Section 4.7 provides detail on the ethical approvals sought for the study.

Data Entry

Following data collection, twenty data entry clerks were recruited by the KSPH to process questionnaires. Ten were assigned for the verification and coding of the questionnaires and ten were assigned for data entry. There was a supervisor for verification and coding and another one for data entry. The Census and Survey Processing System software was used to enter data from the health facility and health worker surveys into separate databases. Data were double entered by separate individuals to minimise data entry errors. Coding consistency was verified by myself and inconsistency across coding groups was documented due to the absence of a pre-agreed code-book for the questionnaires. I subsequently developed a code-book with the Tulane University team which I then applied to consistently code and clean the data.

Data Analysis

Objective 1: Data were analysed in Stata 13. Income data were collected in Congolese Francs and converted into USD using the current exchange rate at the time of analysis.[7] Grubb's test (Grubbs, 1950) was applied to detect outliers in the income data, which were removed prior to analysis. Descriptive statistics were then generated for health worker characteristics, whether workers received a given income source, the frequency of receipt of government payments and in comparison to expectations, and the mean and median amount of each income source received. Logistic regressions using maximum likelihood estimation were run to examine the facility and health worker characteristics associated with receiving a given income source and linear regressions were run to identify the factors determining the level of income received, measured as the log of income. Individual health worker characteristics included: age, marital status, sex, health worker cadre, education, years worked in position, and the number of financial dependents. Facility level factors included: provincial location of the facility, urban-rural status, facility type, number of staff present on the day of the survey, distance of the facility from the nearest village, and the number of primary healthcare services offered. Presence of the ASSP programme was included as an explanatory variable in all of the models. I also examined whether receipt of certain income sources affected the receipt of others by including them as explanatory variables in regression models. For example, when examining the determinants of receiving user fees, receipt of any government payment was included as an explanatory variable.

For each regression model, a general to specific regression specification method was used whereby explanatory variables were excluded from the regression in a stepwise manner if the probability that the coefficient on that variable was zero was greater than or equal to 0.10 – as indicated by the F-statistic (Cameron and Trivedi, 2010). All regression analyses were performed excluding any missing values (list-wise deletion) and standard errors were clustered at the health facility level. Multiple imputation of missing values was not applied as only five variables had missing data and this was less than 4%. Regression diagnostics for each model were also applied and adjustments

[7] Exchange rate as of 26 June 2015 using forex (foreign exchange) currency converter: 923 Congolese Francs to 1 USD.

made to produce unbiased coefficients. These are described in appendix 2 of research paper 1.

Objective 2: Data were analysed in Stata 13 and R 3.4.2 statistical software. Descriptive statistics were used to explore the demographic characteristics of health workers and facility characteristics overall, while differences in characteristics between the previous and non-PBF groups were assessed using Chi-squared and t-tests for binary/categorical and continuous variables respectively. As explained above, workers in the previous PBF group were those who had been exposed to ATH, while non-PBF workers were those who had not been exposed to ATH; the latter non-PBF group included workers covered by ASSP as well as those working in non-ASSP or "control" health zones. Given the ASSP programme had not fully commenced implementation when sampling occurred, amalgamating these two groups enabled a larger sample for comparison against the previous PBF group.

With regards to measuring motivation, psychometric item analysis, examining item distributions, summary statistics, and correlation patterns, was undertaken in Stata 13 for both the overall sample and the previous PBF and non-PBF subgroups. Items which clearly did not correspond well with the other items pertaining to their intended dimension i.e. had low loadings or were loading on other dimensions, were dropped.

Confirmatory Factor Analysis (CFA) was chosen to validate the motivation scale, and confirm the initial hypothesis on the underlying dimensions of motivation as related to the Franco framework (Franco et al., 2002) and specified in table 1 of research paper 3; these included dimensions at the individual, organisational and community levels, as well as behavioural outcomes. Prior to factor analysis, in the few cases where one or several individuals missed a response to an item, missing responses were replaced by imputation of the median value of their responses to other items pertaining to the same dimension. The Kaiser-Meyer-Olkin test was also applied to determine the factorability of the data, with a value exceeding 0.5 deemed acceptable (Field, 2009). CFA using a robust maximum likelihood estimator was then executed in R software using the lavaan package (Rosseel, 2012). During CFA, some of the items relating to certain dimensions had to be dropped as they did not correlate well, meaning their scores were not similar

to one another (see supplementary table 2 in research paper 3). The final dimensions and associated items are presented in table 4 below.

Table 4: Final motivation dimensions linked to Franco framework and associated items

Link to Franco framework		**Dimension**	**Item**
Determinants of motivation	Individual	Conscientious-ness	*I am confident about my ability to handle my work*
			I effectively cope with any new challenges that occur in my work life
			At work you can always depend on me
			My work is always of high quality
			I am a hard worker
			I always arrive on time to work
			I spend my time at work on work-related activities
			I am careful not to make mistakes at work
			When I am not sure how to treat a patient's condition I look for information or ask for advice
			I do things which need to be done without being asked or told
		Pride	*This facility has a good reputation in the community*
			It is a source of pride to work here
			I feel I am doing something important in this work
			The other workers are proud to deliver good care to patients
		Extrinsic motivation	*I only do this job so that I get paid at the end of the month*
	Organisational	Training	*How do you rate your opportunities to upgrade your skills and knowledge?*
			How do you rate your ability to put into practice what you have learned from training?
			How do you rate how you and your colleagues are chosen to attend training?
			I have received sufficient training to do my job well
		Tasks	*How do you rate the description of your job role and tasks?*
			How do you rate satisfaction with your workload?
			How do you rate the division of work between you and your colleagues?
			How do you rate the division of work between caring for patients and other tasks?
			How do you rate the variety of your tasks?
		Availability of equipment /supplies	*How do you rate the availability of medicines in the health facility?*
			How do you rate the availability of equipment in the health facility?
			How do you rate the availability of medical supplies in the health facility?
		Income reflects effort	*The effort that we at this facility put into this job is reflected in our pay*
			My job offers adequate pay compared with similar jobs

			The income I receive is a fair reflection of my skills, knowledge and training
		Sufficiency of income	*The income that I receive from working at this facility more than covers my basic needs such as food, transport, and accommodation*
		Organisational culture	*How do you rate your working relationships with upper-level staff?*
			How do you rate your working relationship with colleagues?
			How do you rate the transparency of the management of financial resources by the facility?
			How do you rate your participation in decision-making to resolve problems in the facility?
	Community	Community relationships	*How do your rate your relationship with local leaders in the community*
Outcomes	Behavioural	Turnover intention	*I intend to leave this facility as soon as I can find another position*

Scores for each dimension were then calculated as unweighted means of responses to items within each dimension, as within each dimension, item loadings were of approximately the same magnitude. Multiple OLS (Ordinary Least Squares) regression models were used to test for significant differences in motivation scores between workers from the non-PBF group and workers in the previous PBF group, controlling for health worker and facility characteristics including: age, gender, health worker cadre, education, years worked in current position, location, type of facility, and presence of the ASSP programme. The dependent variable was the score on each dimension. Standard errors were clustered at facility level and OLS assumptions checked using regression diagnostics as performed in objective 1.

Dimensions measured with more than one item were also tested for measurement invariance across both PBF groups. Measurement invariance testing was undertaken to assess whether the motivation scale had the same measurement properties (scores and variances) in a sample of health workers which had been previously exposed to performance-based financing (PBF), compared to those who had never received PBF. Confirming that the motivation scale exhibits the same measurement properties in different groups means that their scores can be reliably compared. Given workers who had previously received PBF were not distributed at random and worked in a relatively small defined geographical area; this meant relatively fewer of these workers were eventually sampled. To avoid having an unbalanced sample for measurement invariance

testing, the previous PBF group was tested alongside a random sample of workers not exposed to PBF.

4.4.2 Qualitative data for objectives 1 and 2

Design and piloting of interview guides

Interviews were undertaken face-to-face using a semi-structured guide, which was first translated into French and then independently back-translated into English to check for consistency with the original tools. The guide was then pre-tested in a primary health centre in Kinshasa with two nurses before being finalised. For objective 1, interviews examined the sources and amounts of income, and factors influencing their receipt. For objective 2, perceptions and differences in the pre-identified dimensions of motivation were explored between the previous PBF and non-PBF groups. Interviews started with an explanation of the interview purpose, reassurance on confidentiality and seeking of respondents' written informed consent (see appendices 5a and 5b for the consent form and interview guide respectively).

Sampling and collection:

Qualitative research was carried out in November 2014 in four health zones supported by ASSP in the province of Kasai Occidental that were not included in the survey. Four health zones were purposively selected: two health zones where workers had previously received PBF under the ATH programme, as well as two health zones where workers had never received PBF. Two public health centres in each health zone that were easily accessible by road were then chosen by the researchers. Two nurses (one female and one male) were purposively selected from each health centre on the day of the interview, making a total of 16 nurses. Nurses were selected on the basis that they had been working at the same health facility for at least 1 year. Workers identified for interview in the non-PBF group were excluded if they had previously received PBF over the past 5 years. In-depth interviews were conducted in French by myself and a male local researcher who had qualified as a medical anthropologist, and was familiar with the local context. Interviews were undertaken between participants and interviewers in a private room of the health facility and audio-recorded upon gaining respondent consent. At the outset, consent was gained to record all interviews and rapport established by interviewers asking some general questions about the reasons

why participants had chosen nursing as a career. Interviews lasted between one to two hours. Demographic data including age, sex, PBF status of the facility, urban-rural status, nursing grade and number of years working in the facility were collected for each respondent. No nurses refused to participate in the study and no repeat interviews were required.

Data analysis

I took several steps during fieldwork and analysis to maximise the reliability of the study. These included: taking careful notes during non-participant observation and during interviews; typing up notes immediately to ensure accuracy; and reviewing each interview transcription to ensure accuracy.

The local researcher transcribed audio recordings of the interviews into French. As transcripts were faithfully transcribed from audio-recordings, they were not returned to nurses for comment or correction. I then checked each transcript against the original recording and subsequently translated them all into English. Data were managed using NVivo 10[8] software. For both objectives, a coding system was developed by myself based on initial research themes, with deductive coding based on concepts measured in the quantitative analysis as codes (the interview guide in appendix 5b provides the questions and themes explored). Inductive coding was also employed to allow the framework to evolve as interviews were analysed. Thematic analysis (Braun and Clarke, 2006, Boyatzis, 1998) was then applied after the coding process to aggregate similar codes into major concepts or themes.

The application of the coding system was undertaken by both myself and the local researcher independently. We then met for an analysis session which involved discussing the themes generated. Any differences in interpretation were resolved through detailed discussion. Participant feedback on the findings was not actively sought but a summary of the findings from the study were disseminated to health zones by the implementing partners at the end of the programme.

[8] NVivo is a qualitative data analysis computer software package

Reflexivity

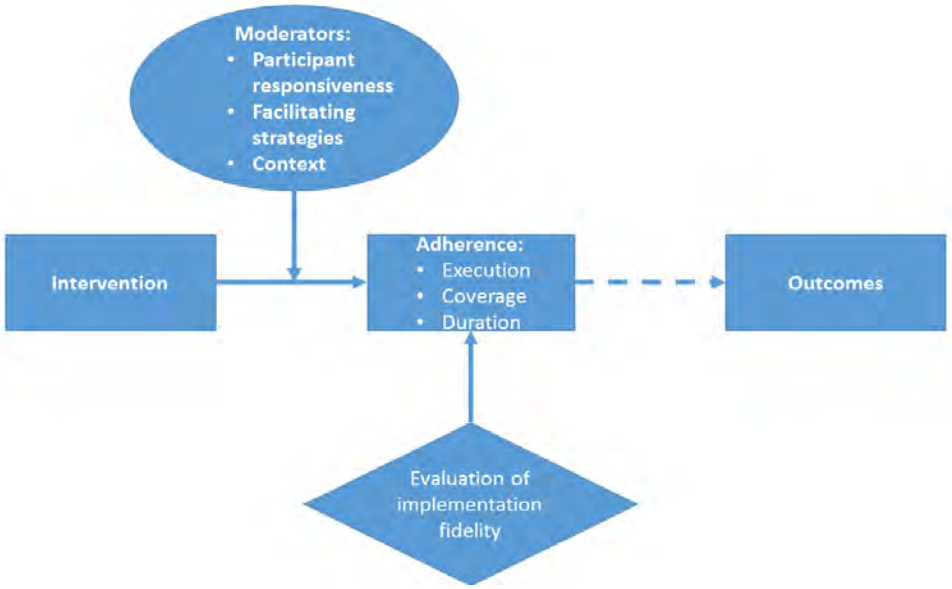
From the outset, I was conscious that I needed to reflect on my own personal characteristics and perceived identity in the field. Having qualified as a medical doctor and specialised in public health, I could relate to an extent on a professional level to the participants of the study. However, being from a developed country often meant that respondents – mainly nurses interviewed for objectives 1 and 2 –initially assumed that I worked for a donor or NGO. Once I had carefully explained my position as an independent researcher as well as our strict code around maintaining confidentiality of their responses, this seemed to reduce the likelihood of social desirability bias of responses as there was a concern that complaining to an external partner could result in withdrawal of support. Occasionally, there were circumstances where I acknowledged that my presence was perhaps inhibiting respondents as I was still regarded suspiciously being a foreigner; in those instances, I trusted my fellow research assistant who had over ten years of experience in undertaking interviews with medical professionals in the DRC, to undertake the interview in my absence and then followed-up with him afterwards.

4.5 Design, collection and analysis of data for objective 3

Design: Conceptual framework and theory of change

The process evaluation of the intervention to facilitate government payments to workers under objective 3 focused on measuring implementation fidelity, potential moderators of implementation, including contextual factors supporting or impeding progress. The assessment of implementation fidelity was based on a framework of implementation fidelity developed by Carroll et al. (Carroll et al., 2007) which seeks to identify the extent to which the intervention had been implemented as planned (implementation adherence) by measuring its coverage, execution and duration (figure 7). Potential moderators of implementation of the intervention identified in the framework were also examined; these included: participant responsiveness, which measures to what extent participants respond to, or are engaged by, an intervention; facilitating strategies, which are measures put in place to optimise the level of fidelity achieved, and; contextual factors external to the intervention which may have acted as either barriers or facilitators to implementation.

Figure 7: Caroll's framework of implementation fidelity



Source: (Carroll et al., 2007).

Data sources and tools for the process evaluation were informed by a theory of change for the intervention. The theory of change was developed during two stakeholder workshops facilitated by myself in October and November 2014. Prior to undertaking these workshops, I attended a one-day training course at the Wellcome Trust on how to develop a theory of change with stakeholders. The theory of change workshops were attended by those directly involved in implementing the intervention. Stakeholders included representatives from: IMA WorldHealth, DFID, Intrahealth, and government officials from the DRC Ministries of Health, Public Service, Finance and Budget. Reflections on the process and lessons learned from the experience of running theory of change workshops to inform a process evaluation of a complex intervention are described in research paper 4 within chapter 7.

Data sources

The process evaluation relied on two main data sources: a document review and in-depth interviews as outlined below.

Document review

Information on the execution, coverage and duration of intervention activities was obtained from relevant project documents: ASSP quarterly progress reports to DFID which required IMA to summarise all activities undertaken by Intrahealth, Intrahealth

reports and presentations to IMA and DFID, and minutes of any meetings held between Intrahealth, IMA, DFID and government Ministries.

Documents for analysis were identified through regular monthly meetings between myself and Intrahealth. Completeness was ensured as Intrahealth had to ensure all of its activities were documented in the quarterly reports as part of their sub-contract with IMA.

Specifically, quantitative data relating to the health worker census was collected by six trained four-person teams consisting of Ministry of Health and IntraHealth personnel. These teams aimed to identify health workers in each health zone in person. Health workers were requested to present themselves to data collection points with relevant supporting documents regarding their education and employment. The census teams then compared names against the lists of health workers available. When health workers who were not on the list showed up for interviews, the identity of the health worker was sought from their direct supervisor and/or the health zone's chief medical officer. The data collection teams also carried out rigorous data quality checks on a daily basis, including physically reviewing presented documents and comparing uploaded data against existing health worker records. A second round of data collection and verification was held to provide health workers who had missed the first visit with a final opportunity to present themselves for inclusion in iHRIS. Health workers who could not be located or confirmed after these two attempts or who presented improper documentation (including falsified documents) were excluded from iHRIS. Data was subsequently triangulated with the Ministry of Finance's payroll system using in-house software to compare names.

I was not granted access to the iHRIS data underpinning the analysis nor the payroll data, so was unable to determine the accuracy and validity of reported information. Therefore, a limitation was that I had to rely on the implementing partners providing factually correct information.

Key informant interviews

The purpose of interviews was to record fidelity of intervention implementation with respect to intervention execution, coverage and duration, against the developed theory

of change. The influence of moderating factors such as participant responsiveness and context was also examined as well as any wider unintended consequences of the intervention. We conducted three rounds of semi-structured interviews with a range of stakeholders (see table 5).

Table 5: List of stakeholders interviewed and rationale for their selection during rounds of qualitative data collection

Organisation/ Location	**Number of respondents per organisation**	**Rationale for interviewing**
Intrahealth	2	Non-governmental organisation responsible for implementing the technical aspects of the intervention.
IMA Worldhealth	3	Lead implementing partner of ASSP
DFID	2	Funding the ASSP programme
World Bank	1	Previous involvement in civil servant censuses, and in implementing governance strengthening programmes in the DRC.
Japanese International Cooperation Agency	2	Involved in programmes to strengthen Human Resources for Health in the DRC.
DRC Ministry of Health (central and provincial levels)	3	In charge of administrative management of health personnel and the list of workers receiving occupational risk allowance payments.
DRC Ministry of Public Sector Reform (central and provincial levels)	3	Charged with recruitment and management of civil servants, including the list of workers to receive payment of salaries.
DRC Ministry of Budget (central and provincial levels)	3	In charge of validating any payroll expenditure (both salaries and occupational risk allowances).
DRC Ministry of Finance (central and provincial levels)	3	Ministry responsible for releasing the payment order (for salaries and occupational risk allowances).
Health zone workers	2	Beneficiaries of the intervention.

As can be seen from table 5, interview participants included those involved in the initial theory of change workshop and others either involved in, able to influence, or benefit from the intervention, and were also identified at different levels of the health system. Most were recruited and selected following preliminary discussions with implementing partners with the purpose of giving a range of views from each agency.

To mitigate against a biased representation of true stakeholder groups, all respondents were asked if there were any other stakeholder who should be interviewed as part of the

process; six stakeholders within each of the existing organisations were identified in this way. Therefore, a purposive sampling approach with some snowball sampling was employed.

The first two rounds of interviews occurred during execution of the intervention in order to capture any dynamic changes in implementation; the first round was between January to February 2015 and the second round took place between April and May 2016. The last round was conducted in March 2018, once most of the intervention activities had been completed. A total of 24 different participants were interviewed, some of whom had repeat interviews at different rounds of data collection.

I undertook the interviews alongside another male local medical anthropologist with over 15 years of experience of interviewing health workers in the DRC. All interviews were face-to-face and started with an explanation of the interview purpose, reassurance on confidentiality and seeking of respondents' written informed consent. None of the interviewees declined to participate and interviews were undertaken in a private room to maintain confidentiality. On gaining consent, all but one stakeholder agreed to be audio-recorded (see appendices 6a-c for consent form and interview guides). In some cases, I already knew the interviewees but in instances where I was meeting the interviewee for the first time, I established rapport at the outset by asking them general questions about what they thought about the ASSP programme and how it affected their day to day role. Interviews varied between 45 minutes to one and half hours in duration and were conducted either in French or English according to the language preference of the interviewee. Demographic data of respondents was not collected but field notes capturing any relevant observations as well as my own personal reflections on the experience of interviews were taken.

Data analysis

Depending on the interviewee, audio recordings were transcribed in French or English by the local researcher and myself (each of the researcher's first languages respectively) to maximise accuracy. I then reviewed all transcripts and managed the data using NVivo 10 software. As transcripts were faithfully transcribed from audio-recordings, they were not returned to stakeholders for comment or correction.

I was the only researcher coding the transcripts for this study, and developed and applied codes using the framework by Carroll et al. (2007) as the main deductive framework. The theory of change was also used to guide coding, providing the basis to compare whether activities planned under the intervention had been executed as intended, and whether consequences of the intervention had been anticipated or not. Interviews were coded iteratively at each round so that themes emerging in early interviews could also be explored in later ones.

Overall feedback from stakeholders on the findings of this study was positive during a meeting in September 2019 between DFID, IMA, Tulane University, the DRC Ministry of Health and other donors. All agreed the results were useful in understanding the process of implementation and where lessons could be learnt.

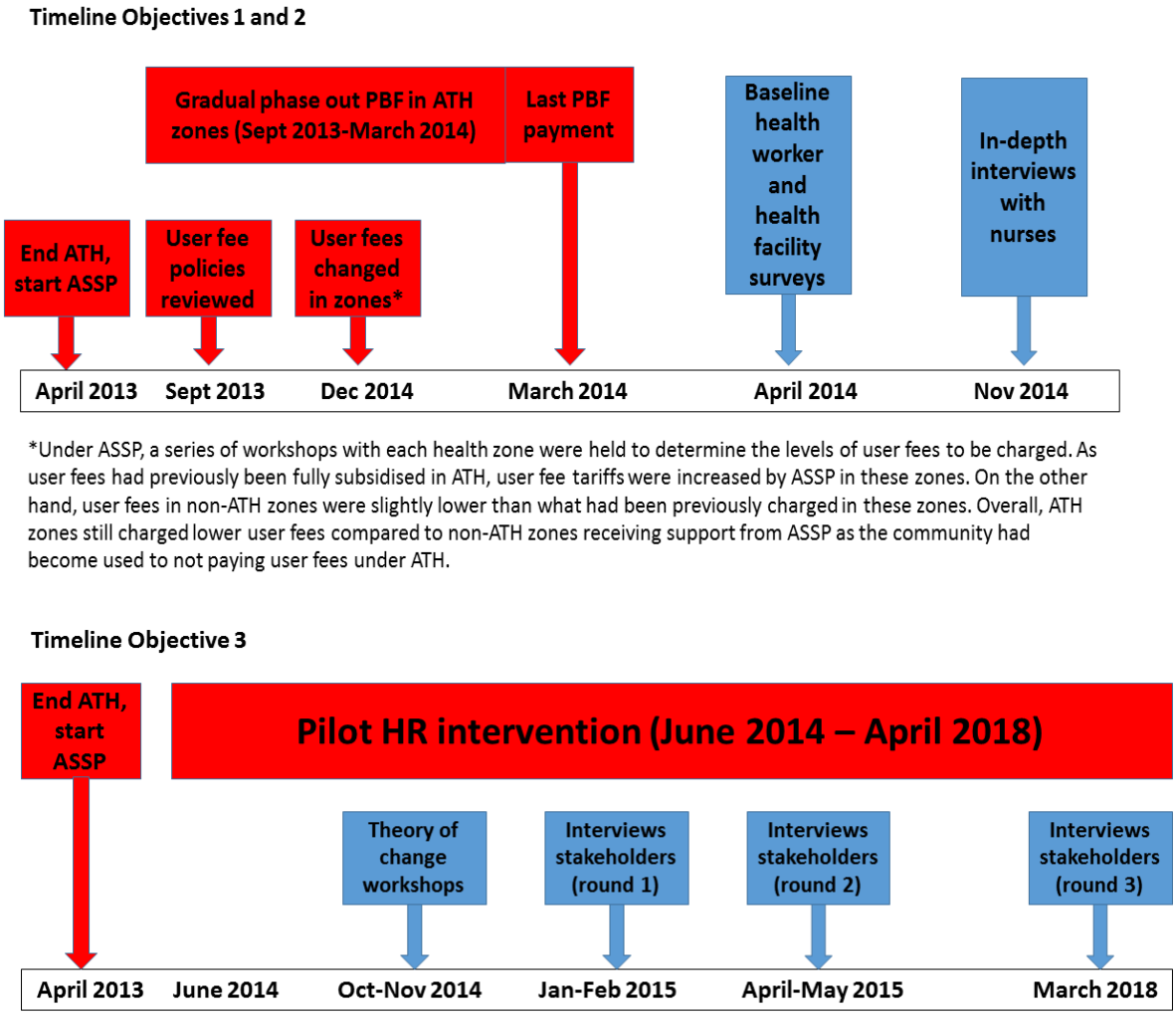
Reflexivity

Given the research I was undertaking belonged to a portfolio of studies agreed by the ASSP programme, I was afforded easy access to key stakeholders to be interviewed, including government. However, I also acknowledged that this would influence how stakeholders discussed the successes and challenges under this objective; external partners may have an optimism bias around the potential success given they were either commissioning or implementing it, while government may not have been as forthcoming around the political issues.

4.6 Chronology of intervention implementation and data collection

Figure 8 below provides an overview of the timing of implementation of interventions and data collection.

Figure 8: Time-frames for interventions and data collection



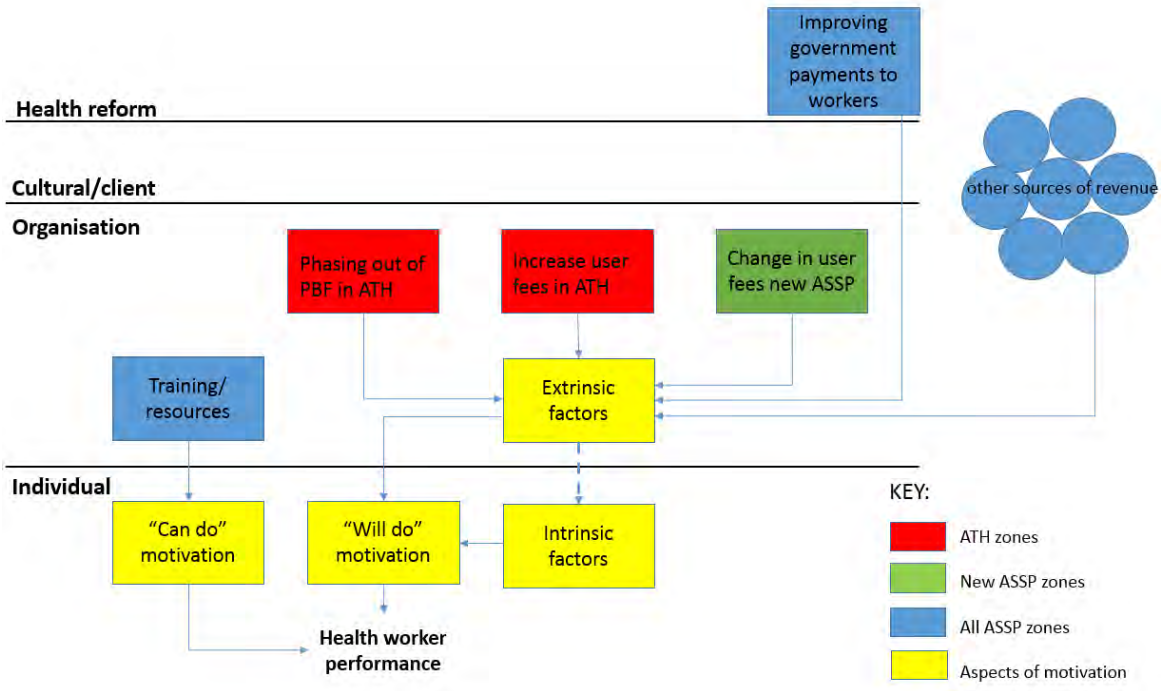
4.7 Conceptual framework

I have developed a conceptual framework which identifies the different components of ATH and ASSP and how they may influence health worker motivation (figure 9). Red boxes indicate interventions in previous ATH zones, green boxes indicate interventions in new ASSP zones, and blue boxes describe interventions happening in all ASSP zones.

Similar to Franco's framework, it illustrates that factors at the individual, organisational, community and health system levels directly affect health worker motivation (Bennett, 2000, Franco et al., 2002), which in turn influence health worker performance. Sources of revenue received by workers to make up their total income originate at the organisational, community or health system level. The phasing out of PBF will affect workers' motivation at the organisation level whereas an intervention to strengthen government payments will be operating from a health policy reform level. In this thesis, the phasing out of PBF and its effects on motivation is specifically being evaluated; the effects on motivation of all other sources of revenue including improving government payments and the changes in user fees is not. However, the conceptual framework recognises that all of these financial incentives will likely affect the extrinsic motivation of workers. The dotted line represents any potential interaction between extrinsic and intrinsic factors affecting individual worker motivation.

Finally, although also not measured within this thesis, the framework recognises that performance is also mediated by the availability of resources in the work environment, and the competence and skills of the worker (Rowe et al., 2005).

Figure 9: Conceptual framework for research



4.8 Ethical considerations

To ensure confidentiality, all data were stored under lock and key or password protected computers. Only key personnel and data managers had access to collected data. The use of unique identifiers further ensured that no data were directly linked to individuals. Obtaining consent from participants was an important part of the ethics process in this research study. Prior to data collection, all researchers undertook Research Ethics and Compliance training run by the Collaborative Institutional Training Initiative Program (Braunschweiger and Goodman, 2007).

During data collection, the study team obtained oral informed consent from each research participant as well as provided contact information to each participant. The consent procedures followed those that are approved by the Ministry of Health and institutional review board of Tulane University (appendix 7) and KSPH (appendix 8). Ethical approval was also granted by the London School of Hygiene and Tropical Medicine (appendix 9).

During the research, some participants disclosed information regarding corruption within the programme, however, in these instances, the anonymity of respondents was respected.

4.9 Funding

This PhD was in part undertaken as part of a research secondment from DFID to Tulane International (a wholly owned subsidiary of Tulane University based in the DRC). Tulane University was the technical partner conducting the impact evaluation and operational research on the ASSP programme. The PhD researcher was line-managed by Tulane International but received a salary from DFID covering the cost of course fees for the London School of Hygiene and Tropical Medicine and living expenses in the DRC.

Other institutions involved in the research included the KSPH, who supported data collection for the baseline survey. Field costs of data collection were covered within the operational research budget for ASSP.

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PART III: RESULTS

5. Remuneration of health workers in the DRC

5.1 Introduction

As discussed in chapter 2, financial incentives play an important role in influencing motivation. In order to design effective incentive packages to improve motivation and performance it is important to understand overall revenue levels as well as the full range of income sources available to workers. Fragile states such as the DRC provide valuable contexts for examining health worker remuneration as the state system of salary payment is often poorly functional, encouraging the diversification of income sources.

Some of the issues with health worker remuneration in the DRC have been described in the study setting in chapter 3. However, an understanding of the availability and relative levels of each source of income, as well as the processes underpinning their receipt, are not well understood.

The research paper in this chapter employs a mixed methods approach to explore the financial environment of health workers in public primary care facilities of the DRC, thus addressing the first research objective. As well as quantifying the amount received by health workers from each income source, this paper also investigates associations between sources of income and various individual, facility and geographical factors. Qualitative insights provide a deeper understanding of the role of context in determining attitudes as well as levels and availability of different sources of income.

This paper has been published in Human Resources for Health, and is presented in this format here.

5.2 Research paper 1

(Cover sheet on next page)

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Student ID Number	215918	**Title**	Dr
First Name(s)	Rishma		
Surname/Family Name	Maini		
Thesis Title	Health workers in the Democratic Republic of Congo: an exploration of their motivation, incentives, and the effects of an intervention to improve their remuneration by government		
Primary Supervisor	Josephine Borghi		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

SECTION B – Paper already published

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If the work was published prior to registration for your research degree, give a brief rationale for its inclusion	N/A		
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SECTION E

Student Signature	[redacted]
Date	30/09/19

Supervisor Signature	[redacted]
Date	30/09/19

Maini et al. Human Resources for Health (2017) 15:17
DOI 10.1186/s12960-017-0185-4

Human Resources for Health

RESEARCH Open Access

A cross-sectional study of the income sources of primary care health workers in the Democratic Republic of Congo

Rishma Maini[1*], David R. Hotchkiss[2] and Josephine Borghi[1]

Abstract

Background: In the Democratic Republic of Congo (DRC), the state system to remunerate health workers is poorly functional, encouraging diversification of income sources and corruption. Given the central role that health workers play in health systems, policy-makers need to ensure health workers are remunerated in a way which best incentivises them to provide effective and good quality services. This study describes the different sources and quantities of income paid to primary care health workers in Equateur, Maniema, Kasai Occidental, Province Orientale and Kasai Oriental provinces. It also explores characteristics associated with the receipt of different sources of income.

Methods: Quantitative data on the income received by health workers were collected through baseline surveys. Descriptive statistics explored the demographic characteristics of health workers surveyed, and types and amounts of incomes received. A series of regression models were estimated to examine the health worker and facility-level determinants of receiving each income source and of levels received. Qualitative data collection was carried out in Kasai Occidental province to explore perceptions of each income source and reasons for receiving each.

Results: Nurses made up the majority of workers in primary care. Only 31% received a government salary, while 75% reported compensation from user fees. Almost half of all nurses engaged in supplemental non-clinical activities. Receipt of government payments was associated with income from private practice and non-clinical activities. Male nurses were more likely to receive per diems, performance payments, and higher total remuneration compared to females. Contextual factors such as provincial location, presence of externally financed health programmes and local user fee policy also influenced the extent to which nurses received many income sources.

Conclusions: The receipt of government payments was unreliable and had implications for receipt of other income sources. A mixture of individual, facility and geographical factors were associated with the receipt of various income sources. Greater co-ordination is needed between partners involved in health worker remuneration to design more effective financial incentive packages, reduce the fragmentation of incomes and improve transparency in the payment of workers in the DRC.

Keywords: Remuneration, Income, DRC, Primary care, Health workers

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Background

Health workers play a central role in the delivery of health care, and their remuneration influences their motivation and workplace performance [1–4]. Post conflict states present an interesting context for examining health worker remuneration as the state system of salary payment is often poorly functional, encouraging a diversification of income sources [5]. Donors may exacerbate income fragmentation by providing programme-related performance payments and per diems [6]. Evidence from these settings has shown that income received from different sources varies according to individual worker and health facility characteristics, with female workers receiving significantly less salary and total income than male workers of the same cadre in Sierra Leone [7], and rural workers having less access to user fee revenue and income from non-clinical activities to those in urban areas in Zimbabwe [8]. A study by Bertone et al. in four provinces in the Democratic Republic of Congo (DRC) identified individual, facility and provincial determinants of variation in total income received [9]. However, the Sierra Leone and Zimbabwe studies were descriptive and did not comprehensively examine the determinants of receiving each income source and none of these studies looked at how receipt of one income source affects the likelihood of receiving other sources, or compiled qualitative data to obtain more in-depth insights into remuneration practices. Moreover, Bertone and Witter have advocated for more empirical research on the overall revenue or "complex remuneration" of health workers, in order to devise effective incentive packages [10].

This study aims to address this gap by examining the remuneration structure of health workers in five provinces of the DRC,[1] assessing the determinants of receiving income by source and the inter-dependency of different sources of income, as well as the determinants of total income received. Qualitative methods are also used to substantiate the quantitative findings and help to discover the processes and mechanisms that underpin the quantitative results.

DRC context

In 2013, public investment in health was only 4.5% of the national budget falling far short of the Abuja commitment of 15% [11]. Although all public sector health workers should receive a salary and occupational risk allowance (or "prime de risque") from the government, not everyone receives these. Services therefore rely heavily on cost recovery through user fees, with no accepted standard national tariff for consultations. Health workers have also become dependent on performance-based payments and/or per diems from external partners.

The public care system accounts for about half of all facilities in the country [12]. The basic unit of the primary care health system is the health zone [13]. Health zones are divided into health areas serving 10,000 to 15,000 people. Each health area should have a health centre providing an essential package of primary healthcare activities. Health centres equipped to carry out certain minor surgical operations are termed reference health centres. In the absence of a health centre or reference health centre, there is a health post.

Methods

Health facility and health worker surveys were conducted as part of a baseline survey linked to an evaluation of a health systems strengthening programme funded by the Department for International Development (DfID) called ASSP (Accès Aux Soins de Santé Primaires) in April–May 2014 [Keating J, Hotchkiss D, Eisele T, Kitoto AT, Bertrand J. Evaluation of the impact of the ASSP project in the Democratic Republic of Congo, unpublished].

Data collection was carried out by data collectors hired from each of the provinces to ensure familiarity with the cultural context. Participation of health workers in the survey was voluntary. To minimise the potential for social desirability bias, the interviewer explained the purpose, confidentiality and anonymity of the study to each provider before seeking consent to begin the survey.

Surveys were carried out in Equateur, Kasai Occidental, Kasai Oriental, Province Orientale, and Maniema provinces in 105 intervention villages selected using probability proportional to size (PPS), and an equal number of control villages matched on geographic location and population size. In total, 210 facilities were selected and all workers providing clinical services and on duty the day of the survey were interviewed.

The health worker survey measured age, sex, cadre, marital status, educational attainment, number of years in their current position, and number of financial dependents. The survey identified income sources received and income levels adapted from the Health Worker Incentive Survey [14] for government payments (salaries, occupational risk allowances), performance payments and per diems from non-governmental partners, private clinical work, user fees from patients, informal payments[2] or "gifts", allowances, and income from non-clinical activities. Respondents were asked whether government payments were received on time, if there were delays receiving these payments, and amounts received compared to expectations. Income levels were recorded in Congolese Francs (FC). Recall was for "last month received" for all incomes with the exception of per diems which was for the "last year". A facility

survey was also carried out to measure the total number of staff, distance of the facility from the village, and the number of primary healthcare services provided. Both surveys were piloted in two health facilities in Kinshasa and one facility in Bas Congo.

Qualitative research was carried out in November 2014 in four urban and four rural health zones supported by ASSP in the province of Kasai Occidental that were not included in the survey. Two nurses (one female and one male) were purposively selected from a health centre in each health zone, making a total of 16 nurses. Interviews examined the sources and amounts of income received, and factors influencing their receipt and were audio recorded in French by RM and a local researcher. Hand written notes were also taken.

Data analysis

Survey data were double entered into CSPro and imported into STATA 13.0 for analysis. Income data were converted into United States dollars (USD) using the exchange rate of 923 FC to 1 USD.[3] Grubb's test was applied to detect outliers in the income data, which were removed prior to analysis. Descriptive statistics were generated for health worker characteristics, receipt of income by source and mean and median income levels. The frequency of receipt of government payments and income compared to expectations are also reported. Logistic regressions examined facility and health worker characteristics associated with receiving a given income source and linear regressions identified determinants of the level of income received, measured as the log of income. Presence of the ASSP programme was included as an explanatory variable in all of the models. Health worker explanatory variables were health worker age, marital status, sex, cadre, education, years worked in position, and the number of financial dependents; facility-level factors were provincial location, urban-rural status, facility type, number of staff, distance from the nearest village, and the number of services offered. We also examined whether receipt of certain income sources affected the receipt of others. The hypothesised relationships between the independent variables and income sources are given in Appendix 1.

In total, 18 models were run and regression diagnostics applied and adjustments made to produce unbiased coefficients (Appendix 2). A general to specific regression specification method was used, excluding explanatory variables in a stepwise manner. All regressions were performed excluding any missing values (list-wise deletion) with clustering at the facility level.

Audio recordings of the interviews were transcribed and a coding system was developed by RM from the initial research themes and concepts that emerged during data collection. Data was managed using NVivo 10 and content analysis was used to identify key themes.

Results

Sample characteristics

Three facilities were private clinics and so did not meet the inclusion criteria of being public sector primary care facilities. This left 207 facilities for analysis.

Twenty three health workers did not meet the inclusion criteria, leaving 453 respondents for analysis. No health workers declined to participate in the survey.

Health workers were mainly located in rural facilities (80.6%) and were based in health centres (81.7%) (Table 1). Most workers were in Kasai Occidental followed by Maniema and Equateur. Most of the workers were in facilities located within 5 km of the nearest village (79.9%), and over 75% offered between six and nine services.

Most respondents were male and between 30 and 45 years old (Table 2). Ninety percent of staff were nurses, and only four doctors were identified across all facilities. The majority had some secondary level education and a third had been to university. Most workers were married and had worked a median of 6 years in their current position.

The analysis of income sources and levels focuses on nurses.

Income sources and levels

Only one third of nurses reported receiving a salary while over half received the occupational risk allowance (Table 3, Fig. 1). A third of nurses did not receive any form of government payment and 18% received both an occupational risk allowance and a salary (Fig. 1). Of non-governmental payments, the most frequently reported were user fees, followed by per diems. Just under half of the sample (47%) reported receiving income from supplementary non-clinical activities. Of these most worked in agriculture (68%), followed by trade (28%). A minority of nurses (7%) reported receiving allowances for uniforms, housing or transport. Less than 10% of workers (n = 29) reported receiving income from private clinical practice, mostly practising at home (n = 24).

The highest median monthly income was for non-clinical work outside the facility ($119), followed by the government salary ($58). The lowest median monthly income came from per diems ($9) and informal payments ($9). The median monthly income across all sources was $85 but the mean was almost double at $165.

Table 1 Facility characteristics of sampled respondents

Facility characteristics of sampled (*n*) workers	Proportion of workers
	%
Facility location (*n* = 453)	
Rural	80.6
Urban	19.4
Province (*n* = 453)	
Equateur	23.0
Kasai Occidental	29.8
Kasai Oriental	5.7
Maniema	27.6
Province Orientale	13.9
Type of facility (*n* = 453)	
Health centre	81.7
Reference health centre	17.2
Health post	1.1
Distance of facility from the village (*n* = 443[a])	
Less than 1 km	31.6
Between 1 and 5 km	48.3
Between 5 and 10 km	12.0
Greater than 10 km	8.1
Number of services provided by facility (*n* = 435[a])	
3 to 5 services	12.2
6 to 9 services	76.1
Over 10 services	3.0
Total clinical staff present on the day (*n* = 453)	
1	13.3
2	34.0
3	23.8
4	16.8
5	6.6
6	4.0
7	1.6
Population catchment for area (*n* = 430[a])	
Less than 5000	48.9
5000 to 10,000	21.6
10,001 to 15,000	17.4
Greater than 15,000	12.1

[a]Less than 453 due to missing values for those variables

Table 2 Characteristics of health workers

Characteristics	Proportion of all workers interviewed	Proportion of nurses
	%	%
Sex	(*n* = 453)	(*n* = 407)
Male	69.3	70.3
Female	30.7	29.7
Age	(*n* = 453)	(*n* = 407)
<30 years	11.5	12.3
30–44 years	59.7	60.7
45–60 years	26.1	24.6
>60 years	3.1	2.5
Marital status	(*n* = 447[a])	(*n* = 407)
Married	90.4	91.8
Single	3.8	3.5
Widowed	3.4	2.5
Separated/divorced	2.2	2.0
Other	0.2	0.3
Education	(*n* = 453)	(*n* = 407)
Primary school	0.4	0.3
Secondary school	60.3	62.9
University/post-secondary school	33.1	35.1
Not specified	6.2	1.7
Position	(*n* = 453)	N/A
Doctor	0.9	
Nurse	89.8	
Laboratory worker	1.1	
Pharmacy worker	1.3	
Traditional birth attendant	2.9	
Auxiliaries, medical and nursing assistants (other non-qualified personnel)	4.0	
	N, mean, SE (median, IQR)	*N*, mean, SE (median, IQR)
Number of financial dependents	437[a], 9, 4.56. (8, 6–12)	393[a], 9, 4.63. (8, 6–12)
Years worked in current position	446[a], 9, 8.72. (6, 3–12)	403[a], 9, 8.68. (6, 3–11)

[a]Less than 453 for all workers or less than 407 for nurses due to missing values for those variables

Over two thirds of nurses receiving the salary and the occupational risk allowance payments reported they were paid on time. Seventeen percent of nurses reported receiving salaries between 1 and 3 months in arrears and 24% reported doing so for occupational risk allowances. Only 2% reported receiving salaries and/or occupational risk allowances more than 3 months in arrears (Fig. 2).

Despite the overall timeliness of payments, the amounts received from government were less than expected (Fig. 3).

Nurses complained more about the frequency of salary payments, than of occupational risk allowances, stating irregular salary payment with no set day of the month. Many had to regularly request an advance from the

Table 3 Proportion of nurses receiving sources of income and mean and median values of income received

Source of income	Overall proportion of workers who received source of income	Median income per month among those receiving income in USD (IQR)	Mean income per month among those receiving income in USD (standard error)
Payments from government			
Salary from government ($n = 407$)	31.2%	52.76 (23–75)	58.06 (60.45)
Occupational risk allowance from government ($n = 407$)	53.8%	12.46 (11–16)	36.57 (73.38)
Payments from other sources			
Performance pay ($n = 407$)	24.1%	16.25 (9–46)	35.79 (48.81)
User fees ($n = 406$)	74.6%	19.50 (11–38)	71.02 (157.95)
Gifts/informal payments from patients ($n = 406$)	16.8%	4.60 (2–11)	8.73 (10.43)
Per diems ($n = 406$)	51.7%	4.06 (2–8)	8.56 (26.35)
Income from private clinical practice ($n = 407$)	7.1%	21.67 (11–54)[a]	34.02 (34.05)[a]
Income from supplemental (non-clinical) activities ($n = 400$)	46.8%	65.01 (33–114)[a]	119.27 (154.62)[a]
Total income ($n = 300$[a])	N/A	85.05 (36–176)[a]	165.26 (227.55)[a]

N.B. For the occupational risk allowance, one outlier income was dropped from the analysis; no outliers were detected for any other income amount
[a]Greater than 10% of data missing as respondents had missing values for some of the amounts of income

facility as they usually ran out of money before their next pay day. It was also common for nurses to borrow from their family or friends to pay the rent or school fees. Nurses reported huge variability in user fee revenue as it was dependent on the number of patients seen at the facility.

None of the in-depth interview respondents reported engaging in private practice or receiving performance payments from partners. A few reported receiving per diems for training or vaccination campaigns. Informal payments or gifts from patients were often in the form of soap, fabric, or food. All nurses were dissatisfied with total compensation received.

Income determinants

The likelihood of receiving a salary increased with every year worked at the facility (OR 1.06, $p < 0.000$) and was greater for staff working in urban facilities (OR 2.48, $p = 0.021$). Nurses were more likely to receive a salary if they were in Equateur than Maniema (0.22, $p = 0.014$).

The odds of receiving the occupational allowance were greater if the nurse had more years of experience (OR 1.20, $p < 0.000$) and a higher number of dependents (OR 1.12, $p = 0.001$. The odds of receiving the occupational allowance were highest in Province Orientale (OR 9.58, $p = 0.001$) compared to Equateur, but lower in Kasai Occidental (OR 0.17, $p < 0.000$) or Kasai Oriental (OR 0.05, $p < 0.000$) (Table 4).

In the in-depth interviews, nurses who did not get a salary stated it was because they started working after the last census of workers in 2006, which was used as a basis for payroll. Some nurses felt health zone officials discriminated against workers from certain tribal or ethnic backgrounds in the payment of the occupational risk allowance.

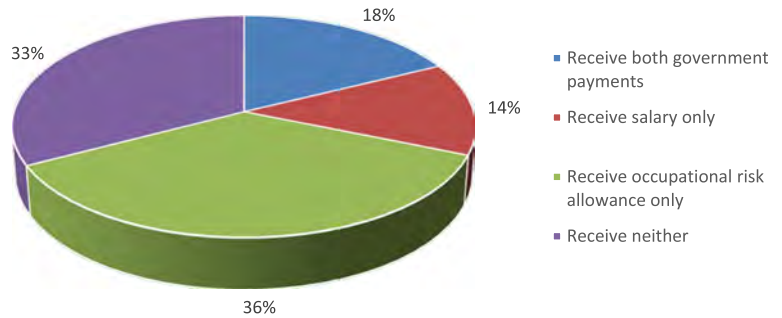

Fig. 1 Proportion of nurses receiving: both government payments, one government payment only, or no government payments

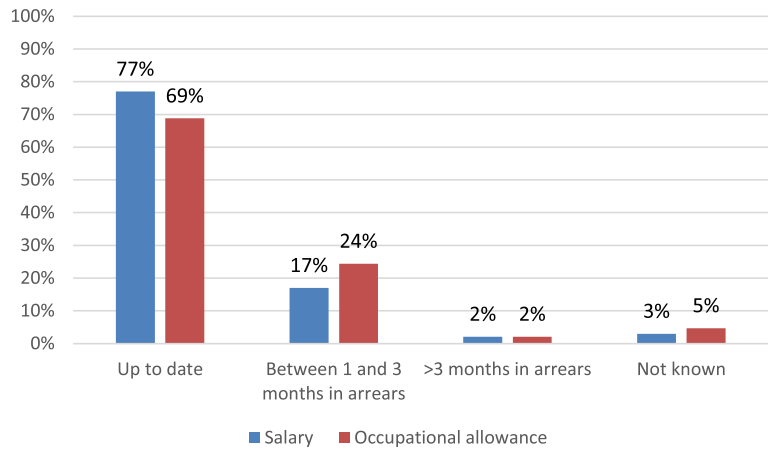

Fig. 2 Frequency of government payments to nurses

According to the quantitative analysis, compared to Equateur, nurses in Maniema were more likely to receive all other sources of income, with the exception of per diems (Table 5). Only those with a higher number of dependents were significantly more likely to receive user fees (OR 1.07 $p = 0.038$).

During in-depth interviews, all nurses reported receiving income from user fees. The process for allocating user fees within the facility was usually overseen by the head of the facility. However, record keeping was often poor meaning the total revenue generated from user fees and allocation process was unclear to some nurses.

> The way in which we divide (user fees)…I don't know if I receive the same thing. The IT (head nurse) and IA (assistant nurse) and me, I don't know if they give the same thing. They give it to me, I sign, that is all.
>
> Female, 60 years

As shown in Table 5, nurses were more likely to receive informal payments if they were not based in Equateur. Staff at facilities with a higher number of personnel were less likely to report receiving informal payments (OR 0.67, $p = 0.07$) and facilities supported by ASSP reported a lower likelihood of informal payments (OR 0.48, $p = 0.039$). Older workers were less likely to receive informal payments (OR 0.96, $p = 0.08$).

The qualitative findings revealed that many nurses were reluctant to charge informal fees, as patients were usually so poor that they struggled to pay user fees. Nurses were less likely to charge informal fees where communities were well informed about the facility user fee tariff, for example, in ASSP areas where community health committees (CODESAs) and facilities were involved in setting and publicising tariffs, meaning nurses could be chastised by the public for asking for informal payments.

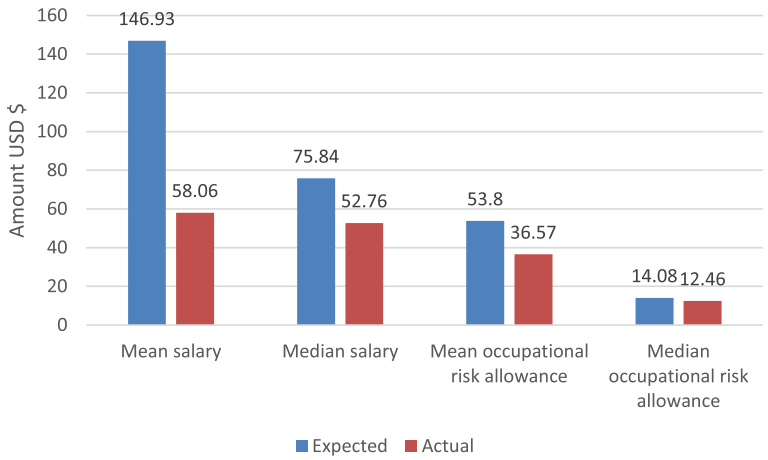

Fig. 3 Median and mean amounts of expected and actual salary and occupational risk allowance for nurses

Table 4 Logistic regressions for salary and occupational risk allowance

Explanatory variables	Odds ratio for dependent variables (SE)			
	Salary		Occupational risk allowance	
	Full model	Reduced model	Full model	Reduced model
Years in position	1.06 (0.02)***	1.06 (0.02)***	1.19 (0.04)***	1.20 (0.04)*** ($p < 0.001$)
Kasai Occidental (vs Equateur)	1.48 (0.69)	1.46 (0.64)	0.17 (0.07)***	0.17 (0.07)*** ($p < 0.001$)
Kasai Orientale (vs Equateur)	1.02 (0.89)	0.71 (0.48)	0.03 (0.02)***	0.05 (0.04)*** ($p < 0.001$)
Maniema (vs Equateur)	0.20 (0.13)**	0.22 (0.14)*** ($p = 0.014$)	1.56 (0.76)	1.30 (0.63)
Province Orientale (vs Equateur)	0.69 (0.43)	1.05 (0.52)	11.07 (7.28)***	9.58 (6.33)*** ($p = 0.001$)
Population served	1.00 (0.00)**	1.00 (0.00)** ($p = 0.043$)	1.00 (0.00)	
Total personnel	1.43 (0.25)**		0.94 (0.19)	
Urban (vs rural)	1.90 (0.86)	2.48 (0.97)** ($p = 0.021$)	2.42 (1.33)	2.10 (0.91)*
Number of services	1.08 (0.12)		0.84 (0.09)	
Distance of facility from village	1.00 (0.03)		1.07 (0.04)*	
Reference heath centre (vs heath centre)	0.74 (0.36)		0.49 (0.24)	0.39 (0.20)*
Age	1.02 (0.02)		1.03 (0.02)	
Male (vs female)	0.92 (0.31)		0.66 (0.24)	
Number of dependents	0.97 (0.03)		1.11 (0.04)**	1.12 (0.04)*** ($p = 0.001$)
Married (vs not married)	1.10 (0.14)		0.67 (0.12)**	0.75 (0.12)*
University (vs school education)	0.77 (0.27)		1.07 (0.41)	
ASSP programme	0.70 (0.28)		0.58 (0.23)	
Received occupational allowance (salary model only)	1.03 (0.35)		–	–
Received salary (occupational risk allowance model only)	–	–	1.06 (0.39)	
Constant	0.04 (0.05)**	0.09 (0.04)***	0.37 (0.41)	0.21 (0.08)***
Pseudo R^2	0.17	0.14	0.35	0.33
Model χ^2	50.90***	46.98***	91.22***	77.56***
Number observations (n)	337	383	318	318

*$p \leq 0.1$; **$p \leq 0.05$; ***$p \leq 0.01$

> …everyone knows, that if you are going to ask for something someone will tell on you, you will be humiliated all the same, instead of asking, you must leave it.
>
> Male, 42 years

Receiving income from private practice was more common in urban than rural areas (OR 2.44, $p = 0.029$) and facilities close to the village. Older workers were also less likely to receive income from private practice (OR 0.92, $p < 0.000$) and staff receiving government payments were more likely to receive income from private practice (OR 2.76, $p = 0.036$). Workers in Kasai Occidental and Maniema were more likely to work privately compared to those living in Equateur.

Reasons given by nurses for not engaging in private practice during interviews included being based far from private clinics, a perceived reduction in job security, and risks of losing the chance of becoming registered with the state and therefore receiving future government pay. However, some admitted that those currently receiving government pay may have been more likely to work privately to supplement their income, which is consistent with the quantitative analysis. Some nurses voiced that the private sector was superior to the public sector, as it was better resourced, staff were better paid and more motivated. However, many criticised the private sector for poor management and a lack of accountability, with patients not being treated according to best practice, and no focus on preventative care.

Table 5 Logistic regressions for determinants of non-governmental sources of income

Explanatory variables	User fees		Informal payments		Private payment		Non-clinical activities		Performance payments		Per diems	
	Odds ratio (SE)											
	Full	Reduced	Full	Reduced	Full	Reduced	Full	Reduced	Full	Reduced	Full	Reduced
Years in position	1.02 (0.02)		1.03 (0.03)		1.02 (0.05)		0.97 (0.02)		1.02 (0.04)		0.99 (0.02)	
Kasai Occidental (vs Equateur)	0.52 (0.23)	0.87 (0.32)	3.13 (2.13)*	2.34 (1.17)*	8.72 (10.09)*	8.42 (8.88)**	0.69 (0.25)	0.65 (0.23)	2.62 (3.02)	2.69 (3.13)	1.29 (0.48)	1.24 (0.41)
Kasai Orientale (vs Equateur)	3.22 (3.86)	3.81 (2.94)*	5.84 (4.64)**	3.77 (2.37)**	1	1	0.99 (0.91)	0.46 (0.37)	1	1	3.67 (3.50)	2.02 (1.35)
Maniema (vs Equateur)	2.65 (1.58)	3.76 (1.73)***	23.82 (18.79)***	12.49 (7.39)***	21.87 (25.97)***	14.53 (16.24)**	3.59 (1.68)***	4.02 (1.81)***	158.86 (191.31)***	132.02 (147.97)***	0.50 (0.26)	0.56 (0.25)
Province Orientale (vs Equateur)	1.54 (0.89)	1.08 (0.47)	9.18 (5.93)***	5.76 (3.00)***	1	1	3.99 (2.27)**	4.42 (2.17)***	1	1	0.41 (0.20)*	0.37 (0.15)**
Population served	1.00 (0.00)		1.00 (0.00)		1.00 (0.00)		1.00 (0.00)		1.00 (0.00)**	1.00 (0.00)**	1.00 (0.00)	
Total personnel	1.12 (0.20)		0.69 (0.11)**	0.67 (0.10)**	0.83 (0.16)		0.79 (0.11)*	0.83 (0.12)	0.98 (0.21)		0.68 (0.11)**	0.72 (0.10)**
Urban (vs rural)	0.63 (0.32)		0.95 (0.48)		2.81 (1.85)	2.44 (0.99)**	0.51 (0.18)*	0.51 (0.15)**	1.17 (0.82)		1.37 (0.55)	
Number of services	0.98 (0.14)		0.96 (0.14)		0.90 (0.10)		1.35 (0.12)***	1.24 (0.11)**	1.71 (0.26)***	1.51 (0.22)***	1.24 (0.11)**	1.24 (0.09)**
Distance of facility from village	0.98 (0.03)		0.97 (0.05)		0.78 (0.07)**	0.88 (0.06)**	0.99 (0.03)		0.78 (0.05)***	0.79 (0.06)***	0.99 (0.03)	
Reference heath centre (vs heath centre)	0.49 (0.25)	0.64 (0.26)	0.54 (0.38)		2.53 (1.27)*		0.89 (0.36)		0.45 (0.28)		0.41 (0.16)**	0.50 (0.16)**
Age	0.97 (0.02)*	0.97 (0.01)*	0.94 (0.03)**	0.96 (0.02)**	0.89 (0.04)***	0.92 (0.02)***	1.03 (0.02)		0.96 (0.03)		1.01 (0.02)	
Male (vs female)	0.82 (0.27)		0.80 (0.32)		1.32 (0.68)		1.03 (0.32)		3.37 (1.62)**	2.36 (1.01)**	1.57 (0.47)	1.74 (0.44)**
Number of dependents	1.08 (0.05)*	1.07 (0.04)**	0.99 (0.05)		1.01 (0.08)		1.06 (0.03)*	1.08 (0.03)***	1.09 (0.04)**		1.05 (0.03)	1.04 (0.03)
Married (vs not married)	0.92 (0.11)		0.95 (0.17)		0.88 (0.20)		1.08 (0.13)		1.34 (0.24)		0.84 (0.10)	
University (vs school education)	0.83 (0.33)		0.84 (0.38)		1.32 (0.79)		0.93 (0.27)		1.02 (0.43)		1.28 (0.36)	
ASSP programme	1.55 (0.64)		0.41 (0.17)**	0.48 (0.17)**	2.47 (1.13)**		1.51 (0.44)		1.74 (1.05)			

Table 5 Logistic regressions for determinants of non-governmental sources of income *(Continued)*

											1.98 (0.64)**	1.80 (0.49)**
Receives any government pay[a]	0.20 (0.08)***		0.95 (0.39)		4.11 (2.37)**	2.76 (1.33)**	0.55 (0.17)*	0.51 (0.15)**	[b]		1.68 (0.47)*	1.92 (0.50)**
Receives user fees	–	–	0.89 (0.41)		–	–	1.32 (0.41)		–	–	–	–
Receives informal payments	–	–	–	–	–	–	1.32 (0.48)		–	–	–	–
Receives payment from private practice	–	–	–	–	–	–	3.00 (1.56)**	2.64 (1.21)**	–	–	–	–
Receives performance payments	–	–	–	–	–	–	0.67 (0.21)		–	–	–	–
Constant	14.87 (20.39)**	4.24 (2.58)**	2.54 (3.75)	0.77 (0.65)	0.27 (0.48)	0.12 (0.13)*	0.03 (0.03)***	0.18 (0.13)**	0.00 (0.00)***	0.00 (0.00)***	0.15 (0.14)**	0.19 (0.13)**
Pseudo R^2	0.15	0.07	0.15	0.10	0.24	0.18	0.16	0.15	0.46***	0.44***	0.13	0.11
Model χ^2	44.56***	21.42***	35.55**	29.59***	42.99***	29.19***	53.16***	44.09***	77.28	47.64	47.41***	52.87***
Number observations (n)	333	391	332	405	286	329	326	367	266	266	333	372

*$p \leq 0.1$; **$p \leq 0.05$; ***$p \leq 0.01$

[a]Government pay = salary and/or occupational risk allowance

[b]The small number of observations meant receipt of government payments could not be included in the model for performance payments

> In the private (facilities) the staff are self-directed but they do not have any sanctions, they behave as they want. But with us here, the hierarchy demands explanations, there is monitoring
>
> Female, 38 years

Staff at facilities with a higher number of personnel were less likely to report receiving per diems (OR 0.72, $p = 0.019$). Nurses in reference health centres were less likely to receive per diems (OR 0.45, $p = 0.032$) than those in health centres, while nurses in facilities far from the village were less likely to earn performance payments (OR 0.79, $p = 0.001$) than those near to the village. Facilities supported by ASSP reported a higher chance of receiving per diems (OR 1.80, $p = 0.031$) as well as workers receiving government payments (OR 1.92, $p = 0.012$). Males and workers in facilities offering a higher number of services were also more likely to receive performance payments and per diems.

During interviews, nurses indicated a preference for government payments over performance payments from development partners as they saw these as more stable and less transient sources of income.

> Because the state, I could stay with the state until death. But the partner, will always be there for a term of 5 years
>
> Male, 30 years

Some of the nurses interviewed felt that per diems were not allocated fairly.

> Ah, it is not well managed (per diems), if someone tells us there is maternity training, it is one person who can go, from the other side it is the IT (head nurse) and IA (assistant nurse), so we others… nothing!
>
> Female, 37 years

Workers reporting income from non-clinical activities were more likely to report income from private practice (OR 2.64, $p = 0.035$), be based in rural areas (OR 0.51, $p = 0.025$) and have a higher number of dependents (OR 1.08, $p = 0.008$). However, workers receiving government payments appeared to be less likely to receive income from non-clinical work (OR 0.51, $p = 0.02$).

Some nurses reported in interviews that those receiving government payments were actually more likely to undertake non-clinical activities, as they knew they would receive their government payments whether they worked in the facility or not but this was inconsistent with the quantitative findings. One worker admitted not coming to work to enable cultivation of crops to earn more income. Nurses who did not engage in supplementary non-clinical activities indicated this was due to a lack of time or an absence of the necessary resources or start-up capital.

> They become negligent…you see, at the end of each month, you go to the bank, you see (them) but you go to the office and there is no-one working. They end up perhaps going to sell things, but at the end of the month, they will go to get their money.
> Female, 30 years

Total remuneration

In Province Orientale ($\beta = -0.47$, $p = 0.032$) and Maniema ($\beta = -1.26$, $p < 0.000$), nurses had lower levels of total income than nurses in Equateur. Males earned more income overall than females ($\beta = 0.21$, $p = 0.05$). Receipt of each income source was associated with a higher overall total income, with the exception of informal payments and payments from private clinical work (Table 6).

Discussion

Nurses constituted the majority of personnel in both primary and secondary care and were the main focus of the study. The high variability in the amounts earned from each income source may be due in part to the fact that nurses make up a fairly heterogeneous group of different grades and levels of educational attainment.

Only a minority of nurses received a government salary, and a higher proportion received occupational allowances, with uncertainty regarding the timing and extent of payments. Part of the reason for the difference between government payments is that they are managed by two different Ministries; the Ministry of Public Sector Reform is responsible for the payroll while the occupational risk allowance is issued using the "declarative list" controlled by the Ministry of Health. Several bottlenecks have also been identified in the budget process which can result in a low execution rate of the allocated funds [15].

The extent to which either type of government payment was received varied across the provinces, likely due to differences in the available government budget for remuneration and a lack of transparency in the allocation of funds by provinces; the majority of the executed funds by province are usually untraceable (H Colquhoun, pers comm). A recent study of Katanga, South Kivu and Kasai Oriental provinces found the allocation and execution of the health budget was inequitable and not based on any pre-defined criteria (e.g. per capita and health indicators) [16]. The occupational allowance also constitutes a lower amount than the salary, potentially allowing more nurses to be paid within the allocated

Table 6 OLS model for total remuneration

Explanatory variables	Coefficient (SE)	
	Full model	Reduced model
Years in position	−0.01 (0.01)	
Kasai Occidental (vs Equateur)	−0.37 (0.19)*	−0.27 (0.17)
Kasai Orientale (vs Equateur)	−0.11 (0.30)	−0.07 (0.28)
Maniema (vs Equateur)	−1.27 (0.26)***	−1.26 (0.18)*** ($p < 0.001$)
Province Orientale (vs Equateur)	−0.74 (0.24)***	−0.47 (0.22)** ($p = 0.032$)
Population served	0.00 (0.00)	
Total personnel	−0.01 (0.08)	
Urban (vs rural)	0.22 (0.26)	
Number of services	0.06 (0.04)	
Distance of facility from village	0.01 (0.02)	
Reference heath centre (vs heath centre)	−0.26 (0.21)	
Age	0.01 (0.01)	
Male (vs female)	0.26 (0.13)**	0.21 (0.12)*
Number of dependents	−0.01 (0.02)	
Married (vs not married)	−0.03 (0.04)	
University (vs school education)	0.11 (0.12)	
Supported by ASSP programme	−0.13 (0.18)	
Receives salary	0.73 (0.14)***	0.79 (0.12)*** ($p < 0.001$)
Receives occupational risk allowance	0.81 (0.15)***	0.70 (0.12)*** $p < 0.001$
Receives performance payment	0.59 (0.18)***	0.77 (0.15)*** $p < 0.001$
Receives user fees	0.65 (0.20)***	0.75 (0.17)*** $p < 0.001$
Receives informal payments	0.01 (0.17)	
Receives income from private clinical work	−0.01 (0.25)	
Receives supplemental income	1.03 (0.13)***	1.00 (0.10)*** $p < 0.001$
Receives per diems	0.20 (0.13)	0.20 (0.11)*
Constant	2.45 (0.42)***	2.91 (0.22)***
R^2	0.48***	0.44***
Number observations (n)	268	328

*$p \leq 0.1$; **$p \leq 0.05$; ***$p \leq 0.01$

budget. A greater proportion of the allocated health budget goes towards the occupational risk allowance than salaries [11]. A repeat census of workers is also needed in order to identify nurses who have more recently started working in facilities and ensure they are paid. Nonetheless, the study found that receiving government payments sometimes had the unintended consequence of giving workers the freedom to work in private practice or non-clinical activities, potentially displacing them from their duties in public facilities.

User fees were commonly reported, representing a substantial share of total income consistent with Bertone et al. [9], but were also highly variable, depending on tariffs and case load. Informal payments appeared infrequent and small, particularly in the ASSP area which aims to improve health service accountability in relation to charges levied and payments received. Where paid, performance payments tended to be comparable in their amount to the occupational risk allowance and income from user fees, and vary by geographic area depending on donor and NGO presence. Health workers in Maniema were more

likely to receive performance payments as they were still receiving payments from the ASSP programme at the time of the survey, although this was being phased out. Nurses in Maniema were also less likely to receive salaries. As the government budget is fungible, it is possible that the government prioritises the allocation of salaries on areas not supported by donor programmes. Health workers may also be less likely to push for inclusion on the payroll if they are receiving an income which substitutes their salary [17]. Nonetheless, workers tended to value government payments more than performance payments, similar to the findings of Fox et al. [6].

Per diems were received by just over half of nurses but contributed little to total income, consistent with Bertone et al. [9]. Per diems were sometimes perceived to be unfairly managed. We found evidence of gender discrimination in the allocation of per diems as well as performance payments, with male nurses being significantly more likely to receive these. Several studies in low-income countries have demonstrated how the mismanagement and abuse of per diems and performance payments can contribute to a negative organisational culture, on account of the tensions they create [18–20]. Care is needed to ensure such payments are distributed equitably across facility personnel and the same staff are not benefitting each time. Payments for overtime were not examined here but were found to be largely irrelevant by Bertone et al. in this context [9].

Less than 10% of workers conducted private clinical work, which corresponds with Bertone et al. [9] and this was more common in facilities close to villages and in urban areas similar to evidence from other countries [8, 10]. Nurses were more likely to engage in dual practice if they received income from the government. Nurses not receiving government payments thought it would be too risky to work in private facilities as it could jeopardise their chances of gaining registration.

Almost half of all workers engaged in non-clinical activities to supplement their income, higher than observed by Bertone et al. [9]. Agricultural practices were the most common which may be because the survey sampled predominantly in rural areas. These activities were sometimes carried out during working hours, which would impact on service delivery.

In terms of the total amount of income gained, differences were driven by both individual and provincial characteristics, again similar to Bertone et al. [9]. Males were more likely to receive a higher total income than females, indicating a gender inequity in receipt of income [21], while workers in Equateur were more likely to earn more than those in Province Orientale or Maniema. Unlike Bertone et al. [9], we did not find any association between facility characteristics and total income; however, their study included a wider variety of facilities.

This study attempts to shed some light on the complex puzzle of how to incentivise vital health workers in hard-to-reach areas in the context of a fragile state. Future policies should try to address some of the unacceptable inequalities related to gender or provincial location. There is low satisfaction with the amount received from formal sources, necessitating an increase in the current wage allowance, as well as perhaps the provision of non-financial incentives such as training and opportunities for career progression in order to effectively retain the workforce.

There were several limitations to this study. Firstly, the health worker survey was limited to those available on the day of the survey and does not capture the views of those absent. Secondly, workers may have under-reported or inaccurately recalled their income [22]. As robust documentation of health worker incomes does not exist in the DRC, it was not possible to validate estimates. Due to resource constraints, qualitative interviews could only be conducted in one of the five provinces and so we were unable to identify reasons for the provincial variation observed. The qualitative interviews preceded the analysis of the quantitative data, and so the quantitative findings could not be discussed during the interviews. A further study which uses the findings of the quantitative analysis as a basis for interviews may allow for more nuanced views. Finally, the facilities sampled represent 2.3%[4] of the overall number of state primary care health centres and therefore the results are not necessarily representative of the provinces as a whole.

Conclusions

In this study, we found that few workers received a government salary but a larger proportion received government payment through the occupational risk allowance. Often, there was a mixture of individual, facility and geographical factors associated with the receipt of various income sources. Greater co-ordination is therefore needed between all partners involved in the remuneration of workers in order to design more effective financial incentive packages, reduce the fragmentation of incomes and improve transparency in the payment of workers in the DRC.

Endnotes

[1]At the time of the study, DRC was composed of 11 provinces which have since been divided into 26 provinces.

[2]Informal payments defined as payments made by patients outside of official channels

[3]Exchange rate as of 26 June 2015 using FOREX currency converter.

[4]Calculated using population data obtained from the Direction d'Etudes et Planification, Ministère de la Santé Publique in October 2013.

Appendix 1

Table 7 Hypothesised relationship of independent variables with income sources

Variables	Hypothesised relationship with income sources
Age	The older the worker, the more likely they are to gain income as elders are respected in DRC (Oppong & Woodruff, 2007). In addition, older workers will have been working for longer and may be paid more based on their experience.
Sex	Globally, while women comprise the majority of employees in the formal health system, they are usually less likely than men to hold senior roles, which tend to receive more pay (World Health Organization, 2010). In a study in Sierra Leone, for certain cadres, women received significantly less salary than males (Witter et al., 2015). In addition, according to the latest Gender Equality Index, DRC was ranked near the bottom (United Nations Development Programme, 2014). Therefore, it will be interesting to examine whether gender inequality also exists in the receipt of certain sources of income (e.g. user fees) when health worker position and education is controlled for. A study in Tajikistan has shown that women are equally as likely as men to charge informal payments once other factors have been controlled for but this has not been explored in other contexts (Dabalen & Wane, 2008). The same study also showed that women were less likely to work outside of the health facility than men.
Number of dependents	There is some evidence that in DRC, those that earn more have a higher number of dependents and so the number of dependents may increase as overall income increases (Weijs, Hilhorst, & Ferf, 2012).
Urban-rural status	Urban areas have a higher population density and so income from user fees may be higher. There are also large discrepancies in access to healthcare between urban and rural areas, with access being higher in urban areas, which may also affect income gained from user fees (World Bank, 2008). Opportunities to receive income from dual practice may be greater in urban areas compared to rural areas, as was observed in Zimbabwe (Chirwa et al., 2014). In addition, a study in Malawi revealed that urban health workers had higher monthly household incomes compared to their rural counterparts (Bowie, Mwase, & Chinkhumba, 2009).
Province	There are large differences in poverty between provinces in the DRC which may have implications for both formal and informal fees charged to patients (Moummi, 2010; United Nations Development Programme, 2009). Equateur is comparatively poorer than the other provinces that have been sampled. According to a recent study, there are wide provincial disparities in domestic public spending on health services, which may affect the amount of government payments received by workers (UNICEF, 2015; World Bank, 2008).
Total number of staff delivering healthcare present on the day	There is some evidence that facilities with more staff receive more income than understaffed facilities (Murro & Pavignani, 2012). On the other hand, income from user fees may be reduced as they are usually divided among workers at the end of the month. Having a high number of personnel may result in lower amounts being received by each staff member (Bertone & Lurton, 2015).
Number of services offered	Increasing the number of services available to a population is one way of improving access (Gulliford et al., 2002). This improved access may be reflected in increased utilisation rates resulting in higher incomes from user fees.
Distance of the facility from the village	Evidence has shown that distance travelled by patients is a key determinant of the utilisation of health services, and so may impact on the amount of user fees collected at facilities (Shannon, Bashshur, & Metzner, 1969).
Education	The level of education will vary by position and within positions. Doctors should hold a seven-year university degree, while the education of nurses depends on their grade; it varies between two years of secondary school to a three year university degree (Yngfors & Andersson, 2010). The difference in grade (and therefore education) is reflected in the payment of salaries.
Marital status	Several wage determination studies have found a positive wage effect of marriage even when other variables such as productivity and hours worked have been controlled for (Korenman & Neumark, 1991; Pfeffer & Ross, 1982; Kalachek & Raines, 1976; Hill, 1979).
Years in position	The longer a worker has been in their position, the more likely they are to receive a salary as they may have been identified in the last comprehensive health worker census in 2006. This census aimed to ensure workers were correctly registered on the government payroll.
Type of facility	Reference facilities are bigger, offer more services and serve a greater population compared to health centres. Therefore, income opportunities may be different within each.
Total population of village	User fees and therefore total income are influenced by demand factors such as the total population eligible to access healthcare.

Table 7 Hypothesised relationship of independent variables with income sources *(Continued)*

Presence of ASSP programme	The programme implemented a subsidised user fee policy which would have influenced the amount of income gained from this source. In addition, the programme does not supply performance payments and was even phasing out performance payments in the province of Maniema provided by a previous health programme at the time of the survey. Finally, the programme has a mandate to strengthen the accountability of health services to the community; it would therefore be expected that informal payments would be less common in ASSP sites.

Appendix 2

Table 8 Regression diagnostics

Model	Income sources	Regression diagnostics	Assumptions tested
Logit model	All sources of income	Ramsey RESET test	Functional misspecification
		Hosmer-Lemeshow test	Goodness of fit
Ordinary least squares*	Total income, salary, occupational risk allowance and user fees	Shapiro-Wilk test	Normality of residuals
		Ramsay RESET test	Functional misspecification
		Breusch-Pagan/Cook Weisberg test	Homoskedasticity
		VIF test	Multicollinearity

*For OLS, log of positive values was used

Abbreviations
ASSP: Accès Aux Soins de Santé Primaires (Access to Primary Health care); CODESA: Community health committees; DFID: Department for International Development; DRC: Democratic Republic of Congo; FC: Congolese Francs; NGO: Non-governmental organisation; OR: Odds ratio; PPS: Probability proportional to size; USD: United States dollars

Acknowledgements
We would like to acknowledge the contribution of Dr Natasha Palmer from the London School of Hygiene and Tropical medicine to the design of the study. We also thank the Kinshasa School of Public Health and Ann-Marie Yongho and Paul Lusamba of Tulane International (TILLC) who oversaw the implementation of the baseline survey, and Cele Manianga who assisted the collection of data for the qualitative component of the study.

Funding
The study was funded by the UK Government's Department for International Development as part of the ASSP Project (Accès aux Soins de Santé Primaires).

Availability of data and materials
The datasets used for the current study are available from the corresponding author on reasonable request.

Authors' contributions
RM analysed and interpreted the survey data. RM also designed, collected, analysed and interpreted the qualitative data of the study and drafted the manuscript. JB and DRH helped to design the study and write the manuscript. All authors read and approved the final manuscript.

Competing interests
The authors declare that they have no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
The study received human subjects review and approval from the Tulane University Institutional Review Board (Reference number: 14–633280), the Kinshasa School of Public Health Ethics Committee (Reference number: ESP/CE/024/2014), and the London School of Hygiene and Tropical Medicine Research Ethics Committee (Reference number: 8475). Informed consent was obtained from all participating healthcare providers.

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Received: 14 July 2016 Accepted: 14 January 2017
Published online: 20 February 2017

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6. Health worker motivation in the DRC and effects associated with removing PBF

6.1 Introduction

Chapter 5 has set the background to this chapter by giving an overview of the complex financial environment within which primary care workers in the DRC operate. The financial incentives received by workers have an important bearing on their motivation. As noted in chapter 2, policy makers are becoming increasingly aware of the importance of health workers' motivation and how it affects their performance. Gaining an understanding of motivation, its drivers, and its impact on behaviour is needed to inform strategies aimed at improving health worker performance and therefore quality of care. However, the challenge with motivation is that it cannot be directly observed, making its measurement difficult. Although numerous descriptions of good measurement practices exist, their translation into applied research is often difficult.

The objective of the second research paper was to share our experience of developing and validating a tool to measure health worker motivation. In doing so, we hope to make other public health researchers aware of some of the common pitfalls to avoid, thus helping to improve future practice.

A common form of financial incentive provided by development partners which aims to improve health worker motivation is PBF, and has been described in detail in chapters 1 and 2. However, the availability of long-term financing to support PBF schemes in low- and middle-income settings is not always assured. As a result, evidence of the potential consequences of terminating such PBF schemes, such as lowering health worker motivation due to the removal of income associated with PBF, is needed. The focus of much of the research around PBF to date has been on demonstrating its effectiveness, with less attention to its effects on the health system, especially when it is withdrawn.

The third research paper also included in this chapter investigates the composition and levels of motivation of health workers in primary health care facilities of the DRC, as well as the effects associated with the withdrawal of a PBF scheme on motivation. This paper provides the results of the second research objective of this PhD.

6.2 Research paper 2

(Cover sheet on next page)

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Student ID Number	215918	**Title**	Dr
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Thesis Title	Health workers in the Democratic Republic of Congo: an exploration of their motivation, incentives, and the effects of an intervention to improve their remuneration by government		
Primary Supervisor	Josephine Borghi		

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Stage of publication	**Submitted**

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Conceptualised the paper and led on the first draft. Led on revisions received from JB, JL and SM-J.

SECTION E

Student Signature	[redacted]
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Supervisor Signature	[redacted]
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Measuring the motivation of health workers: a reflection on the methodological issues and lessons learnt

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Key words: motivation, measurement scale, health workers, confirmatory factor analysis, Democratic Republic of Congo, measurement invariance.

Abstract

Background: A competent and motivated health workforce is one of the essential building blocks of a well-functioning health system. Gaining an understanding of motivation, its drivers, and its impact on behaviour is therefore important to inform strategies aimed at improving health worker performance and quality of care. However, the challenge with motivation is that it cannot be directly observed, making its measurement difficult. Although numerous descriptions of good measurement practices exist, their translation into applied research is often problematic.

Methods: In this article, we reflect on our experiences in developing and validating an instrument to measure health worker motivation in the Democratic Republic of Congo. Specifically, we recount what actually happened and identify what could have been improved upon at the design, sampling, data collection and analysis stages.

Results: Key issues manifesting at the analytical and interpretative stage largely related to shortcomings in the preparatory phase, due to lack of time and resources as well as psychometric and motivation-related expertise at the outset. The main lessons learnt were that the design stage is critical as it lays the foundations for meaningful data collection and analysis. Any shortcomings at this stage inevitably reveal themselves at the analysis stage, both in technical terms as well as in regards to the interpretation of results.

Conclusion: It is worth investing time and resources when developing a motivation instrument, particularly within a sound and culturally appropriate conceptualisation of motivation. We hope by openly sharing our experience with other public health researchers working in this area that they will be more aware of some of the common pitfalls to avoid thus helping them to improve future practice.

Background

Human resources for health are recognised as one of the six building blocks of health systems (World Health Organization, 2006). Low- and middle-income countries face significant challenges with respect to human resources for health; these include: shortages of health care providers, an inequitable distribution of workers, deficiencies in skill-mixes and inadequate training of staff (Ranson et al., 2010). As acknowledged by the World Health Organization, "developing capable, motivated and supported health workers is essential for overcoming bottlenecks to achieve national and global health goals". Motivation is a key determinant of practices and behaviours of health workers (Rowe et al., 2005, Chen et al., 2004). An understanding of the drivers of motivation is therefore important to informing strategies aimed at improving health workers' performance.

Measuring motivation, however, is difficult as it is a psychological process which cannot be directly observed (Pinder, 2008). Yet, over recent years, there has been an increasing body of research aiming to understand the motivation of health workers in low- and middle-income countries (Hotchkiss et al., 2015, Lohmann et al., 2016, Lohmann et al., 2018, Lohmann et al., 2017a, Lohmann et al., 2017b, Alhassan et al., 2013, Mutale et al., 2013, Bonenberger et al., 2014). A recent paper has outlined the steps required in developing a high-quality motivation scale – which refers to a set of statements or questions in a survey tool intending to measure motivation (Borghi et al., 2017). Yet, there are few studies reflecting on this ideal methodology and challenges in its practical application (Prytherch et al., 2012).

In this article, we aim to share the lessons learnt from developing and validating a psychometric scale to quantify the motivation of workers in the Democratic Republic of Congo (DRC) by giving an account of what happened in practice, and then reflecting on each stage of the process in relation to the ideal methodology outlined in Borghi et al. (2017). We believe that sharing our experience will be of practical value to other researchers developing similar measurement tools, helping them avoid potential pitfalls. Although our reflection relates to the specific case of developing and applying a health worker motivation measure, our reflections are equally valid in relation to the

measurement of related psychological constructs such as satisfaction, perceptions, or attitudes, in health workers as well as in other populations of interest.

Context for measuring health worker motivation

The health worker motivation scale was nested in a larger health worker survey conducted as part of the baseline of a population-based evaluation of a new health systems strengthening programme, called Accès Aux Soins de Santé (Access to Primary Healthcare or ASSP). ASSP covered 56 health zones in provinces of Equateur, Kasai Occidental, Province Orientale, Maniema and South Kivu.[1] It aimed to support health centres and hospitals to deliver a package of basic primary health services, and included interventions targeted at health workers with the intent of improving their work motivation. ASSP also phased out performance-based financing (PBF) - performance-conditional financial incentives to health care providers (Meessen et al., 2011) – in twenty health zones where it had been provided by a predecessor programme.

In addition to informing the ASSP evaluation, we aimed to make use of the motivation scale to compare the motivation of health workers who had previously received and then experienced the withdrawal of PBF with that of workers who had never received PBF. We hypothesised that motivation levels would be lower in workers who had previously received PBF but then had them removed, compared with those who had never received such payments. The results of this analysis have recently been published elsewhere (Maini et al., 2019).

Designing the motivation measurement tool

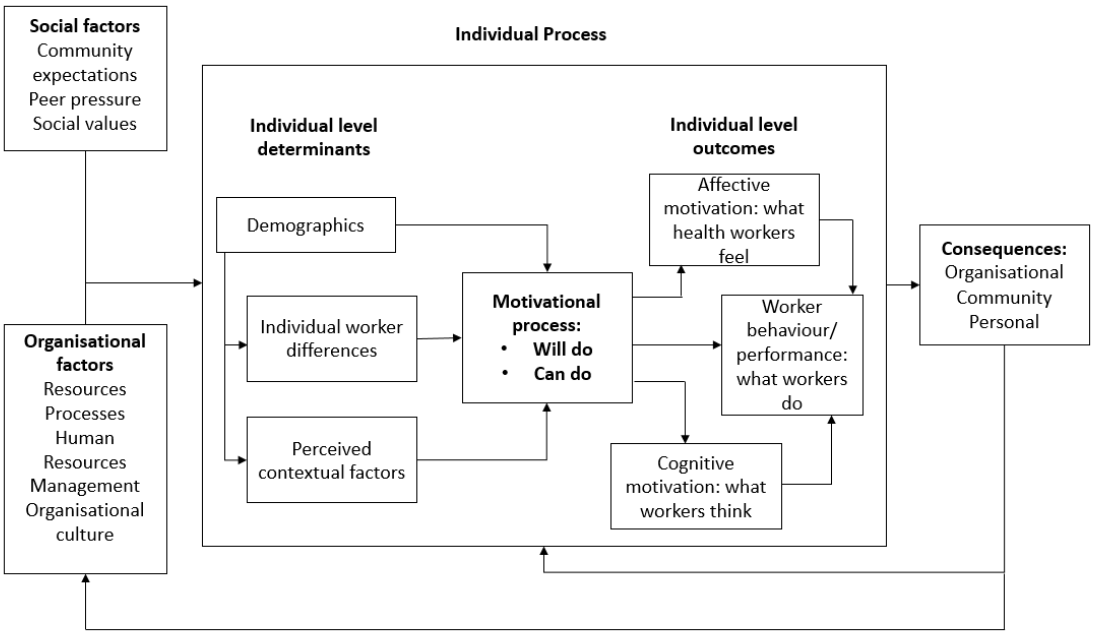
What actually happened

We intended to quantify health workers' motivation, using a structured, interviewer-administered health worker survey. In initially designing the questionnaire, 47 Likert-type questions or items were selected by the principal investigators of the overall ASSP evaluation based on previous surveys they had used in other countries as well as a review of the literature (Khan et al., 2013, Hansen et al., 2008, Banteyerga et al., 2010).

[1] In July 2015, the provinces of the DRC underwent 'decoupage,' whereby the DRC's 11 provinces were further subdivided into 26. This paper refers to the provinces prior to decoupage.

These items were grounded in the Franco conceptual framework of motivation (Franco et al., 2002) given its extensive use in other low- and middle-income countries (see figure 1).

Figure 1: Franco framework of motivation



Legend: The Franco framework conceptualises motivation as being influenced by various determinants and consequences at the individual, organisational and societal level. Motivation is determined by the congruence of worker and organizational goals ("will do" motivation) and factors that are focused on the ability of the individual to execute a task ("can do" motivation).

A month prior to finalisation of the questionnaire, the principal author, who had not up to that point been involved in the initial questionnaire design, joined the research team as a PhD student and had the opportunity to review, modify and add questions as needed. Given the principal author's interest in measuring motivation within the thesis, another rapid literature review on previous motivation surveys in low- and middle-income countries was undertaken (Prytherch et al., 2012, Agyepong et al., 2004, Penn-Kekana et al., 2005, Chandler et al., 2009, Faye et al., 2013, Mutale et al., 2013, Mbindyo et al., 2009, Alhassan et al., 2013), resulting in 11 further questions being added, making a total of 58 items. In order to ensure the final questions were relevant to the context and would actually measure what was intended, the principal author discussed the items with partners implementing ASSP; this resulted in the proposal of

an additional 2 items by development partners. Although the data were collected for these additional questions, since these items were not hypothesised to be associated with a dimension a priori, they were not included in the analysis of the motivation scale. The tool was then translated into French and pre-tested with six health workers in two non-study facilities. The purpose of the pre-test was to identify difficulties in understanding of questionnaire items, assess non-response rates, test the consent form and estimate the length of time to administer the survey. Following the pre-test, only minor grammatical changes to the phrasing of two questions were made in order to clarify understanding. Additional file 1 summarises the final survey items alongside each dimension.

Key reflections on the questionnaire design process

Conceptualisation of motivation

Motivation is often viewed as a complex, multi-dimensional construct. Numerous theories and taxonomies of work motivation exist which have their origins in various disciplines including behavioural economics and psychology (Franco et al., 2002, Maslow, 1943, Kanfer et al., 1999, Deci et al., 1999, Locke, 1997, Herzberg et al., 2011, Vroom, 1964) Therefore, a clear conceptualisation of motivation, including which dimensions of motivation are of interest, is fundamental to developing a good measurement instrument that optimally serves the purpose of the study (Borghi et al., 2017). In retrospect, we had not given this conceptual phase enough room in the design of the study and questionnaire. This was also in light of the fact that motivation had not been a key focus of the study initially, and that there was very limited time to finalise the survey tool.

The lack of time devoted to conceptual thinking at the design stage had two main consequences. First, we chose the Franco motivation framework as the most widely used health worker motivation framework in low- and middle-income countries to date (Borghi et al., 2017). However, it later became apparent that the Franco framework – and tools developed to measure its dimensions – were not ideally suited to answer key questions related to health worker motivation and PBF; for example, Self Determination Theory (SDT) may have been a more appropriate framework to examine the potential crowding out of intrinsic motivation through financial incentives (Lohmann et al.,

2016). Applying SDT would have also yielded different items to those which were used in this study.

Second, rather than using qualitative research to identify items to measure the dimensions of the Franco framework which were relevant to the DRC context, we instead worked with questions on motivation which had been used and validated in other contexts and then linked them back to the Franco framework of motivation. While this has the advantage of efficiency and also that questions had been pre-tested and used in other settings, they were not necessarily adapted to the local context. In addition, although this did not appear problematic in the design stage as we were able to easily assign all items to their respective motivation dimensions, at the analytical stage we realized that not all dimensions had been adequately covered, both in regards to their conceptual breadth i.e. with respect to the definition and scope of the dimension, and in terms of number of items measured per dimension. This was because during the design stage, we were thinking less about which dimensions to include and more about which items had been used in previous settings. A key lesson therefore was to think about the dimensions first and their relevance to the intervention/theory, and then ensure enough items were included to measure them. Nonetheless, the more fundamental issue was that the Franco framework was not the best fit for the research given the focus on PBF; had preliminary qualitative work been undertaken at the outset, this could have been identified early on.

Adaptation to the cultural context

Another risk in relying on measurement scales from other contexts is that researchers may miss aspects and interpretations of motivation unique to the culture of the study country (Machungwa and Schmitt, 1983, Rowe et al., 2005, Agyepong et al., 2004). This was particularly pertinent to the DRC where no previous studies on health worker motivation had been undertaken.

The principal author came into the research study at a late stage, during a time when pressure to finalise the health worker survey was high. This meant it was not possible to conduct any preliminary qualitative work with health workers to inform the questionnaire design, as recommended by others (Prytherch et al., 2012, Borghi et al., 2017). Such work could have strengthened the relevance of the motivation scale to the

local context. For example, questions on the stability of work contracts and government salaries had to be dropped in the analysis stage as they were not applicable to the majority of workers (see additional file 2).

Piloting

At the piloting stage, for practical reasons, we only tested the tool with four nurses and two doctors, all of whom had attained at least a secondary level of education. However, a larger variety of cadres and grades of health workers were eventually interviewed in the final survey, 6.6% of whom had either only received primary level education or had not specified their level of educational attainment. It is possible that the more complex questions were not as well understood by those with lower levels of education, as has been shown in previous motivation surveys (Bennett, 2000). In addition, the pilot sample size was insufficient for undertaking meaningful statistical analysis of the pilot data, or allow us to check model fit. Particularly with respect to developing scales, authors have recommended a pilot sample size of between 10 to 40 participants per group to evaluate adequacy of instrumentation (Hertzog, 2008, Johanson and Brooks, 2010). An alternative to a large pilot sample size could have entailed using "think-aloud" interviews. This technique requires participants to verbalise their thoughts while completing a task (Willis, 2004), and is being increasingly applied to understand the completion of survey questionnaires (Ryan et al., 2009, Collins, 2003, Westerman et al., 2008, Al-Janabi et al., 2013). Employing this method would potentially have uncovered any difficulties with terminology and phrasing, as well as any differences in the interpretation of questions. The latter is particularly important in assessing content validity, to ensure the instrument measures what it intends to measure.

Sampling

What actually happened?

The motivation measurement scale was embedded within a wider health worker survey carried out according to the protocol and sampling strategy of the ASSP impact evaluation, which also included a health facility and household survey (Keating et al., 2013). As motivation was not a primary outcome for the wider evaluation, the sample size calculation was rather based on detecting significant differences in health outcomes from the household survey. In total, 210 health facilities were to be sampled. All health workers of all cadres present in facilities on the day of the survey were to be

interviewed by data collectors trained for the purpose in settings assuring respondent privacy. We had assumed that there would be on average 4 health workers in facilities based on national statistics on staffing levels, yielding an approximate sample of 840 respondents. This met the required sample size for confirmatory factor analysis (CFA) of at least 200 observations (Decoster, 1998). More detail on CFA and the rationale for using this statistical method is provided in the section "data analysis".

Key reflections on sampling

Sampling issues

Following data collection, the number of respondents to the health worker survey was much lower than expected; the total number interviewed was only 485, almost half the number originally estimated, however this still met the requirements for CFA. Reasons for the lower number of sampled workers included larger-than-expected discrepancies between staff on the payroll and staff actually available for interviews on the data collection days, as well as large differences in staffing levels by region and facility type. This lower sample size had implications for the analysis stage as detailed below.

One of the objectives of the research was to compare motivation levels of workers who had previously received PBF with those workers who had never received PBF. However, the sampling of workers was not undertaken with respect to PBF status but rather to evaluate the ASSP programme. As workers in PBF and non-PBF groups were not randomly distributed but rather determined by the geographical coverage of the predecessor health programme, this resulted in an imbalance in the number of workers in each group. This would have implications for the subsequent data analysis, and is also discussed later on.

Data analysis

What actually happened?

We chose CFA to validate the motivation scale by empirically confirming the initial attribution of questionnaire items to motivation dimensions in the Franco framework. This was deemed more appropriate than exploratory factor analysis (EFA) as we had a prior hypothesis on the dimensions of motivation which would be relevant to the Congolese context; EFA on the other hand is useful when there is no prior theory about which items pertain to which dimension (Borghi et al., 2017).

CFA largely supported the assumed item attribution with a few modifications (see additional file 2 for details). We then calculated scores for each motivation dimension as unweighted means of responses to items within each dimension, since within each dimension, item-factor loadings were of approximately the same magnitude. Multiple Ordinary Least Squares (OLS) regression models were employed to examine the determinants of these 'composite' scores for different dimensions of motivation.

We also applied measurement invariance testing to examine whether the motivation scale had the same measurement properties in the sample of health workers which had been previously exposed to PBF and those who had never received PBF.

Key reflections on the analysis stage

Confirmatory factor analysis

On average, each dimension originally had four items assigned to it. However, in the course of the CFA model fitting, we had to drop a number of items which did not correlate with other items as intended (see additional file 2). For most of these items, ill model fit made us realize suboptimal or ambiguous phrasing of items within the scale, implying that dimensions were not well measured by questions. In retrospect and as discussed above, it would have been good to conduct a more extensive quantitative piloting of the scale, as this might have given us a chance to detect these issues before the main data collection.

Dropping some items in the CFA model fitting stage is a frequent reality of psychometric research (Kline, 1998, Borghi et al., 2017). Nonetheless, the risk, as in our case, is that it results in some motivation dimensions being covered by only one or two items. This is not only problematic from a psychometric point of view, where a minimum of three items per dimension is recommended, but also from a conceptual point of view, as one can question whether a complex motivation construct can be assessed in its conceptual breadth by only one questionnaire item. In hindsight, it would have been good to anticipate the potential loss of items during analysis, and to include more items per dimension within the initial survey. In the current study, however, this would have been problematic as the survey was already very long. It may have been

more appropriate to have had a separate survey solely focussed on measuring motivation rather than a motivation scale integrated into a larger survey.

Testing for measurement invariance

A key part of the analysis was to identify whether there were differences in the motivation of workers who had previously received PBF and those who had not. Measurement invariance tests for equal measurement properties within subgroups and is applied within a CFA framework (Borghi et al., 2017).

Measurement invariance testing does not necessitate a much larger sample than a simple CFA, at least so long as the subgroups to be compared are of similar size (Kline, 1998). This was unfortunately not the case for us. As described above, the sampling strategy was designed for the primary purpose of the ASSP impact evaluation. It resulted in a comparatively much smaller sample of health workers previously exposed to PBF (previous PBF group = 118 workers, non-PBF group = 335 workers). To avoid having an unbalanced sample for measurement invariance testing, we tested the previous PBF group alongside a random sample of a similar number of workers not exposed to PBF. However, the small sample sizes (118 in the previous PBF group versus 124 in the non-PBF group) ended up affecting the precision of measurement invariance testing (Meade and Bauer, 2007). Although strong invariance was still identified for a number of dimensions, two dimensions were not invariant which meant that any differences in scores between groups needed to be interpreted with caution.

Multiple regressions versus Structural Equation Modelling

We employed multiple regression techniques to compare composite scores between respondents previously versus never exposed to PBF. The use of composite scores inevitably results in a loss of information on potentially important variance at the individual item level as variation is averaged out in the calculation process. Structural Equation Modelling (SEM), on the other hand, is a more sophisticated technique which preserves full information in the data (Skrondal and Laake, 2001).

However, using SEM for substantive regression analyses often requires large sample sizes given the large number of parameters to be estimated *(*Wolf et al., 2013), and was therefore unfortunately not an option for us. So long as measurement invariance testing

supports equal measurement properties across groups, however, comparing composite scores across groups is a good second-best strategy to SEM for each group, and possibly even easier than SEM in terms of communicating the results to policy makers.

Lessons learnt

Several practical lessons were learned from our experience of trying to measure the motivation of health workers in the DRC. The main lesson was that the conceptual and survey design stage is critical as it lays the foundations for data collection and analysis. Any short-comings and omissions at the design stage inevitably manifest themselves at the analysis and interpretation stage.

Therefore, where possible, it is worth investing time and resources when designing the motivation measurement instrument, particularly in clarifying how motivation should be conceptualised in the specific context of application. If possible, preliminary qualitative research will be immensely helpful in this regard. It may make sense to involve experts in psychometrics early on in order to ensure that measurements derived with the tool can be subjected to as rigorous an analysis as possible.

Further, we did not give enough consideration to the number and characteristics of workers who would be sampled, and how they would respond to the questionnaire. It is recommended to pre-test and pilot the tools with respondents who are as representative of the final survey sample as possible to limit biases, and ensure clarity and comprehension of questions. In addition, researchers may wish to consider undertaking some "think-aloud" interviews with a small sample of respondents to ensure consistency of measurement and reduce ambiguities.

Finally, although the field of health worker motivation is gaining interest in low- and middle-income countries, it is still not regarded as a priority outcome in the context of large-scale impact evaluations of health programmes targeting health workers. This was evidenced here by the limited time available to develop the scale and reliance on using questions from previous studies without tailoring them adequately to the context. Given the central role played by health workers in health systems, we strongly advocate for affording the issue of health worker motivation and its drivers more prominence in

research, as this will ultimately help to inform more effective interventions aimed at improving healthcare delivery.

In conclusion, we hope that our lessons learnt from this experience are useful to other researchers embarking on developing tools to measure health worker motivation or related constructs such as satisfaction or attitudes, particularly in contexts where they have not been studied previously.

List of abbreviations

ASSP	Accès Aux Soins de Santé or Access to Primary Healthcare
CFA	Confirmatory Factor Analysis
DRC	Democratic Republic of Congo
EFA	Exploratory Factor Analysis
OLS	Ordinary Least Squares
PBF	Performance-Based Financing
SEM	Structural Equation Modelling
SDT	Self Determination Theory

Declarations

Ethics approval and consent to participate

The study referred to in the article received ethical approval from the Tulane University Institutional Review Board (Reference number: 14-633280), the Kinshasa School of Public Health Ethics Committee (Reference number: ESP/CE/024/2014), and the London School of Hygiene and Tropical Medicine Research Ethics Committee (Reference number: 8475). Informed written consent was obtained from all participating healthcare providers.

Consent for publication

Not applicable

Availability of data and material

The data for the study referred to in this article are available from the corresponding author upon reasonable request.

Competing interests

The lead author has recently been appointed as a health adviser for the Department for International Development (DFID). DFID funded the health systems strengthening programme referred to in the article.

Funding

The UK Government's Department for International Development funded the survey referred to in the article.

Authors' contributions

RM drafted the initial manuscript. JL, JB and SM-J reviewed and helped to write the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We would like to acknowledge staff in Tulane International (TILLC) and the Kinshasa School of Public Health who oversaw the implementation of the health worker survey mentioned in this article.

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Supplementary files for research paper 2

Additional file 1: Dimensions and associated items in final survey tool

Dimension	Item
Conscientiousness	*I am confident about my ability to handle my work*
	I effectively cope with any new challenges that occur in my work life
	At work you can always depend on me
	My work is always of high quality
	I am a hard worker
	I always arrive on time to work
	I spend my time at work on work-related activities
	I am careful not to make mistakes at work
	When I am not sure how to treat a patient's condition I look for information or ask for advice
	I do things which need to be done without being asked or told
Pride	*This facility has a good reputation in the community*
	It is a source of pride to work here
	I feel I am doing something important in this work
	The other workers are proud to deliver good care to patients
Training	*How do you rate your opportunities to upgrade your skills and knowledge?*
	How do you rate your ability to put into practice what you have learned from training?
	How do you rate how you and your colleagues are chosen to attend training?
	I have received sufficient training to do my job well
Tasks	*How do you rate the description of your job role and tasks?*
	How do you rate satisfaction with your workload?
	How do you rate the division of work between you and your colleagues?
	How do you rate the division of work between caring for patients and other tasks?
	How do you rate the variety of your tasks?
Availability of equipment /supplies	*How do you rate the availability of medicines in the health facility?*
	How do you rate the availability of equipment in the health facility?
	How do you rate the availability of medical supplies in the health facility?
Income reflects effort	*The effort that we at this facility put into this job is reflected in our pay*
	My job offers adequate pay compared with similar jobs
	The income I receive is a fair reflection of my skills, knowledge and training
Sufficiency of income	*The income that I receive from working at this facility more than covers my basic needs such as food, transport, and accommodation*
Organizational culture	*How do you rate your working relationships with upper-level staff?*
	How do you rate your working relationship with colleagues?
	How do you rate the transparency of the management of financial resources by the facility?
	How do you rate your participation in decision-making to resolve problems in the facility?
Community relationships	*How do your rate your relationship with local leaders in the community*
Turnover intention	*I intend to leave this facility as soon as I can find another position*
Extrinsic motivation	*I only do this job so that I get paid at the end of the month*

Note: Additional file 2 is the same as supplementary file 2 for research paper 2

6.3 Research paper 3

(Cover sheet on next page)

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RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

SECTION A – Student Details

Student ID Number	215918	**Title**	Dr
First Name(s)	Rishma		
Surname/Family Name	Maini		
Thesis Title	Health workers in the Democratic Republic of Congo: an exploration of their motivation, incentives, and the effects of an intervention to improve their remuneration by government		
Primary Supervisor	Josephine Borghi		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

SECTION B – Paper already published

Where was the work published?	International Journal of Health Policy and Management		
When was the work published?	13 July 2019		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion	N/A		
Have you retained the copyright for the work?*	Yes OPEN ACCESS CC-BY	Was the work subject to academic peer review?	**Yes**

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Where is the work intended to be published?	
Please list the paper's authors in the intended authorship order:	

Stage of publication	Choose an item.

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Conceived the study, and designed it in collaboration with JB and DRH. Designed, analysed and interpreted the quantitative and qualitative data. Drafted the initial manuscript, and all authors helped to revise it critically for intellectual content.

SECTION E

Student Signature	[redacted]
Date	30/09/19

Supervisor Signature	[redacted]
Date	30/09/19

http://ijhpm.com
Int J Health Policy Manag 2019, x(x), 1–16

doi 10.15171/ijhpm.2019.55

IJHPM International Journal of Health Policy and Management

Original Article

What Happens When Donors Pull Out? Examining Differences in Motivation Between Health Workers Who Recently Had Performance-Based Financing (PBF) Withdrawn With Workers Who Never Received PBF in the Democratic Republic of Congo

Rishma Maini[1*], Julia Lohmann[2], David R. Hotchkiss[3], Sandra Mounier-Jack[1], Josephine Borghi[1]

Abstract

Background: A motivated workforce is necessary to ensure the delivery of high quality health services. In developing countries, performance-based financing (PBF) is often employed to increase motivation by providing financial incentives linked to performance. However, given PBF schemes are usually funded by donors, their long-term financing is not always assured, and the effects of withdrawing PBF on motivation are largely unknown. This cross-sectional study aimed to identify differences in motivation between workers who recently had donor-funded PBF withdrawn, with workers who had not received PBF.

Methods: Quantitative data were collected from 485 health workers in 5 provinces using a structured survey containing questions on motivation which were based on an established motivation framework. Confirmatory factor analysis was used to verify dimensions of motivation, and multiple regression to assess differences in motivation scores between workers who had previously received PBF and those who never had. Qualitative interviews were also carried out in Kasai Occidental province with 16 nurses who had previously or never received PBF.

Results: The results indicated that workers in facilities where PBF had been removed scored significantly lower on most dimensions of motivation compared to workers who had never received PBF. The removal of the PBF scheme was blamed for an exodus of staff due to the dramatic reduction in income, and negatively impacted on relationships between staff and the local community.

Conclusion: Donors and governments unable to sustain PBF or other donor-payments should have clear exit strategies and institute measures to mitigate any adverse effects on motivation following withdrawal.

Keywords: Motivation, Health Workers, Performance-Based Financing, Democratic Republic of Congo, Factor Analysis

Citation: Maini R, Lohmann J, Hotchkiss DR, Mounier-Jack S, Borghi J. What happens when donors pull out? examining differences in motivation between health workers who recently had performance-based financing (PBF) withdrawn with workers who never received PBF in the Democratic Republic of Congo. *Int J Health Policy Manag.* 2019;x(x):x–x. doi:10.15171/ijhpm.2019.55

Article History:
Received: 30 October 2018
Accepted: 23 June 2019
ePublished: 13 July 2019

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Key Messages

Implications for policy makers

- This research indicates that the withdrawal of donor-funded payments may have harmful repercussions for health worker motivation and service delivery.
- Programmes unable to sustain donor-funded payments to health workers should develop realistic exit strategies and institute measures to mitigate against any adverse effects on motivation prior to withdrawal.
- Governments and donors designing new performance-based financing (PBF) schemes or programmes involving supplemental payments to workers should consider whether the short-term advantages of introducing additional health worker payments outweigh the potential adverse long-term consequences in the event that donor financing ceases.

Implications for the public

This research has demonstrated the potential negative implications for health worker motivation when donor-funded payments provided through a performance-based financing (PBF) scheme are withdrawn. PBF is increasingly being employed by the international community as a mechanism to enhance worker motivation and performance in fragile settings. However, the long-term funding for PBF is not always guaranteed. This study warrants consideration by those either designing or considering how to exit from a PBF scheme or programme administering supplemental payments to workers.

Full list of authors' affiliations is available at the end of the article.

Background

Human resources for health are one of the core pillars of health systems,[1] and the performance of health workers directly affects the quality of health services. Knowledge and competency are not the only influences of health worker performance.[2,3] Studies have confirmed that there are differences in practice between what health workers "know" should be performed, and what they actually "do," and this is termed the "know-do" gap.[4] Alongside other factors including enabling working conditions, motivation is thought to be one bridge in overcoming this gap,[5] and is often defined as the "degree of willingness of an individual to exert and maintain an effort towards attaining organisational goals."[6]

In developing countries, health workers face many challenges to delivering services, including inadequate resources, supervision and training. In such settings, highly motivated workers will attempt to overcome such obstacles in order to be as productive as possible. Addressing poor health worker motivation can therefore lead to significant gains in efficiency and performance.[7-9]

One way of influencing motivation is through incentives, which may be financial or non-financial. Financial incentives are monetary rewards given to a worker,[10] while non-financial incentives include: career development, resource availability, hospital management, supervisory support and recognition.[11-14] With respect to financial incentives, performance-based financing (PBF) can be employed, and involves the transfer of funds (either totally or in part) to health workers based on their attaining a pre-defined level of performance. However, while PBF is expected to increase motivation and therefore effort, in some low-income countries and fragile states, the effects of introducing PBF upon motivation have produced mixed results; workers in Rwanda reported increased levels of motivation under a PBF scheme,[15,16] while a study in Afghanistan indicated that PBF did not have a bearing on motivation and performance.[17] In Malawi, PBF appeared to impact upon health worker motivation through different mechanisms, for example by improving their working environment.[18] The authors recommended PBF schemes should be designed and implemented in anticipation of the different ways they will influence motivation, in order to ensure effects on motivation can be maximised.[18,19]

Donors often initially fund PBF in low-income country settings. According to the World Bank's Results Based Financing for health website, the Health Results and Innovation Trust Fund has committed US$385.6 million to funding PBF programmes in 29 countries, which is linked to US$2 billion in financing from the International Development Association.[20] Yet, with the exception of a few countries including Rwanda, Republic of Congo, and Burundi,[21-23] the availability of government financing to take over such donor-funded schemes is not always assured. The volatility and unreliability of foreign financing could leave developing countries vulnerable if donors were to withdraw their aid.

Given financing is not always secure, knowledge of the implications of terminating such donor-funded payments is urgently needed to counteract any potentially harmful consequences for health worker motivation. To date, the authors are only aware of one study which was undertaken by Huillery and Seban,[16] that examined the withdrawal of donor-funding in a low-income country which was the Democratic Republic of Congo (DRC). It compared health worker motivation between 2 groups – one receiving an exclusively performance-based payment, and the other group receiving a fixed payment of the same amount. The findings indicated that the motivation of workers was higher under the performance payment compared to the fixed payment, but following the removal of both payments, worker motivation was lower in the group which had received the performance payment. The study further found that the previous PBF group placed greater importance on financial motives than on non-material motives compared to the fixed payment group, which could not be attributed to a decrease in worker income.

Our study goes beyond the work undertaken by Huillery and Seban in that it examines differences observed across a vast range of dimensions of motivation between 2 groups of health workers; one group who recently experienced the removal of a donor-funded PBF scheme (comprising of both a fixed and variable payment related to performance) and another group of workers who were not exposed to PBF. The study also qualitatively explores how the withdrawal of PBF affected health workers, and reasons behind any differences identified between the 2 groups.

Study Setting

Like many fragile states, the DRC struggles to provide basic healthcare to its citizens.[24] Despite the domestic health budget mainly serving to finance health workers, few public sector health workers receive their government salary at all.[25,26] Consequently, several donors have implemented PBF in an attempt to motivate the health workforce and enhance quality of care.[27]

Between 2008 and 2013, the Department for International Development (DFID) provided funding to 2 international non-governmental organisations (NGOs) to support health centres and hospitals to deliver a package of basic primary health services. The programme was called Access To Healthcare (ATH), and was implemented in 20 health zones in the provinces of Kasai Occidental, Province Orientale, Maniema, and South Kivu in the DRC[1]. The programme heavily subsidised user fees and additionally implemented PBF, involving monthly supplemental fixed payments to public sector health workers of $75 plus a monthly performance-based payment ($25). Facilities were scored against a series of quantitative performance targets, for example the attainment of 80% coverage for assisted births. Workers only received the performance payment if their facility achieved above a certain total score. Verification of performance was conducted by the implementing partners, who compared reported health service indicators with those found in health facility registers, and also visited a sample of patients recorded on the register to cross-check accuracy of information.

At the end of ATH in March 2013, DFID commenced a follow-on programme called Accès Aux Soins de Santé Primaire (Access to Primary Health Care or ASSP) in a total

of 56 health zones – the 20 health zones of ATH, and a further 11 zones in Equateur and 25 zones in Kasai Occidental (Figure 1).

The ASSP programme continues to support the provision of essential primary health services. However, during the first year of ASSP, PBF (both the supplemental fixed payment and performance payment) to health workers was phased out in the 20 health zones of the previous ATH programme by $25 every 3 months. Firstly, the $25 performance-based component of the payment was withdrawn 3 months after the start of the new ASSP programme (in July 2013). Then the fixed income component was reduced by $25 every 3 months thereafter, so all donor-funded payments to workers had ended by March 2014. Therefore, after 5 years of implementation under ATH, PBF was removed in a structured and gradual way under the successor programme ASSP. This occurred in tandem with a marginal increase in the user fee tariff, in an effort to help substitute health workers' loss of revenue.

Conceptual Framework

Over 70 years of research particularly in psychology and behavioural economics have led to numerous definitions, theories, and taxonomies of motivation in general and work motivation in specific.[28] Motivation is usually viewed as a complex, multi-dimensional construct. For instance, motivation is often distinguished into different forms by its drivers (eg, extrinsic versus intrinsic motivation[28,29]; Hackman and Oldham's Job Characteristics Model)[30] or by its locus of causality (Self-Determination Theory).[31] Other theories such as goal setting theory are concerned with individuals' cognitive processes leading to motivated behaviour, it's direction, intensity, and duration.[28] Along with this variety of conceptualisations, numerous motivation measurement tools have been developed and validated, attempting to capture motivation either by asking directly about, or by asking about or observing proxies (eg, asking for factors assumed to be closely associated with motivation, such as working conditions; observing behaviours assumed to be the consequence of motivation).[32,33]

In low- and middle-income country (LMIC) health systems, interest in understanding the work motivation of the healthcare workforce is recent, but more and more studies are being conducted and published.[18,19,34-39] Motivation researchers in LMICs struggle not only with the many available conceptualisations and measures, but also with the fact that very few have been validated and/or customised to the specific cultural contexts and work settings.[33] Notable exceptions include a Self-Determination Theory-based psychometric scale,[36] as well as the Franco framework.[8,40,41] The Franco framework, which was also used in this study, is to date the most widely used framework in the current body of literature on work motivation of health workers in LMICs and captures motivation indirectly through various assumed motivational determinants and consequences at the individual, organisational and societal level (Figure 2). These determinants are described as either affecting the "will-do" component of motivation, the alignment of individual's goals to that of the organisation, or the "can-do" component of motivation, which refers to the ability of the individual to mobilise resources to execute a task. Individual motivation outcomes are the result of the interaction between the "can-do" and "will-do" components of motivation, and can be affective, cognitive and behavioural. Affective outcomes concern health workers' satisfaction, cognitive outcomes relate to health workers' perceptions of their job, and behavioural outcomes relate to the performance of health workers. This study conceptualises motivation according to the Franco framework, measuring the impact of PBF withdrawal on various motivational determinants and consequences. In the following sections, we use the term 'dimensions' to refer to

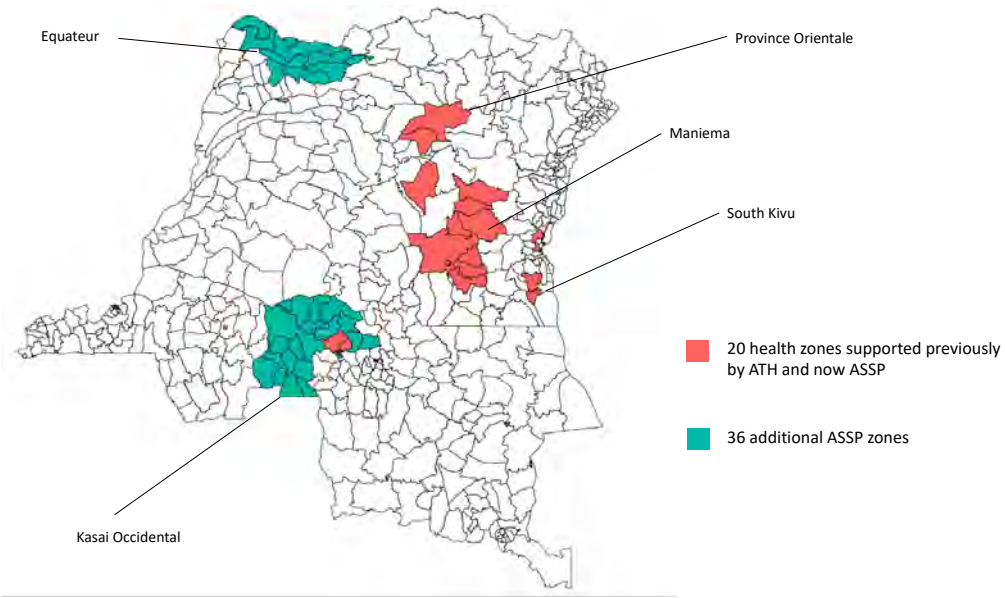

Figure 1. Health Zones in the DRC Supported by Different Health Programmes Funded by DFID. Abbreviations: ASSP, Access to Primary Healthcare (2013-2018); ATH, Access to Healthcare (2008-2013); DRC, Democratic Republic of Congo; DFID, Department for International Development.

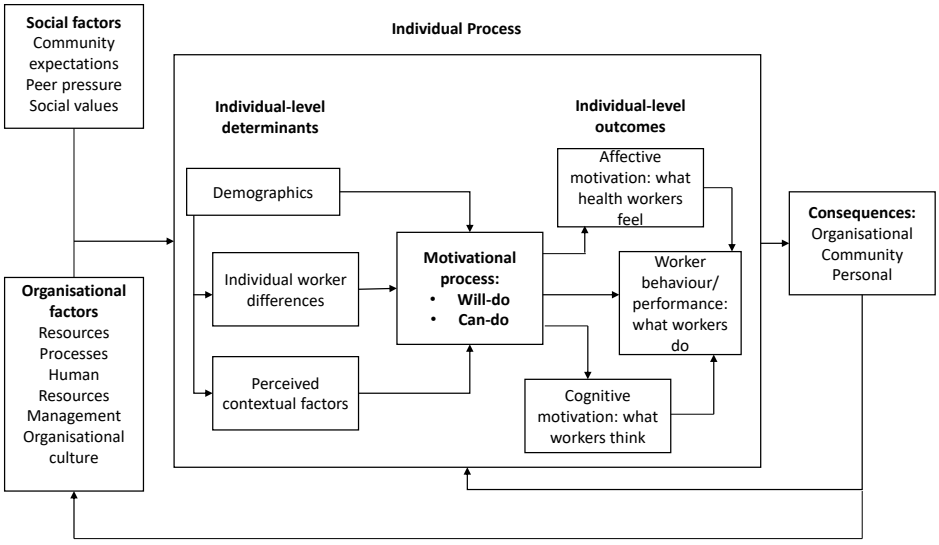

Figure 2. Franco's Conceptual Framework of Motivational Determinants, Outcomes and Consequences. Source Franco et al.[40]

the individual-level determinants and consequences through which motivation is defined and measured in the Franco framework.

Methods

The study employed a mixed methods triangulation design. In line with Creswell and colleagues,[42,43] we use the term triangulation to refer to the use of different methods of data collection and analysis to explore different aspects of the 'phenomenon.' Specifically, we use quantitative methods to quantify motivational factors, and qualitative methods to elucidate the reasons why there may have been differences in motivation scores between health workers who had previously been exposed to PBF and health workers who had not been exposed. Quantitative data were collected through a health worker survey and allowed a comparison of scores on motivation dimensions between workers who had experienced PBF withdrawal with workers who had never received PBF; in other words, those who had been working in ATH areas prior to ASSP (previous PBF group) with workers who had not been covered by the ATH programme (non-PBF group). This latter group included workers covered by the ASSP programme as well as those working in non-ASSP health zones to enable a larger sample for comparison, and implementation of ASSP was still at an early stage. Qualitative data were collected using semi-structured interviews. Triangulation of quantitative and qualitative findings occurred at the interpretative stage.

Quantitative Data

Using Franco's framework,[6] dimensions of motivation were identified. To identify questionnaire items to measure each dimension, an extensive review of health worker motivation surveys was performed and appropriate items collected.[11,39,41,44-53] Identified items and dimensions were discussed with development partners to confirm the selection was relevant to the setting. However, it was not possible to cover all specified dimensions of motivation according to the Franco framework given other competing priorities of the health worker survey. As a result, we had to be conservative on the number of questions and therefore dimensions of motivation that we could measure. The final dimensions selected were those deemed to be of greatest importance and applicability to the DRC context.

The final questions were then incorporated into the health worker survey, which also gathered demographic information on health workers, including: age, gender, cadre, educational attainment, number of years worked, and number of financial dependents. Small revisions were made following a pre-test of the survey in 2 non-study facilities in Kinshasa and a facility in Bas-Congo. All items were answered on a 5-point Likert scale, with certain question responses worded "strongly disagree" to "strongly agree" and others worded "very dissatisfied" to "very satisfied." The response "not applicable" was included for items where it was possible the question was not relevant.

Sampling

The surveys were undertaken as part of a baseline evaluation of ASSP.[54] Province Orientale and Maniema were combined to form one sampling domain, Kasai Occidental and Kasai Oriental formed another, and Equateur was its own sampling domain. 105 primary care facilities in ASSP areas were randomly sampled and matched with 105 facilities on urban/rural status and catchment population size in areas where ASSP was not operational (35 intervention and 35 control facilities in each sampling domain). Therefore, although this study was nested within the ASSP baseline evaluation, the sampling of facilities and workers had not taken into account coverage of the previous ATH programme ie, whether workers belonged to the "previous PBF group" or "non-PBF group." This latter group included workers working in non-ASSP health zones as well as ASSP zones which had not been covered by ATH. As a result, there was an imbalance in the final sample of former PBF workers compared to non-PBF workers, with a far greater number of the latter. For this study,

the intervention group was workers in ASSP that had received PBF, and the comparison group were workers (ASSP or non-ASSP) who had not received PBF. Figure 3 illustrates the results of facility sampling by PBF status.

All workers providing clinical services and on duty on the day of the survey were interviewed from sampled facilities. The head of the facility also completed a facility survey to determine the total number of staff, population served, and the number of services provided at the facility.

Data were collected between April and May 2014, which meant that any workers sampled in the previous PBF group had stopped receiving any donor-funded payments for at least one month. The Kinshasa School of Public Health in collaboration with Tulane University hired and trained data collectors from each of the sampled provinces to administer the surveys. Data collectors explained the purpose, confidentiality and anonymity of the study to each health worker in obtaining informed consent to participate in the survey.

Statistical Analyses

Survey data were double-entered into the computer database CSPro for verification before being imported into and analysed in Stata 13 and R 3.4.2 statistical software. Descriptive statistics were used to explore the demographic characteristics of health workers and facility characteristics overall, and differences between the previous and non-PBF groups assessed using chi-square and *t* tests. For the motivation dimensions, psychometric item analysis, examining item distributions, summary statistics, and correlation patterns, was undertaken in Stata 13 for both the overall sample and the previous PBF and non-PBF subgroups (see Supplementary file 1, Table S1). Items which clearly did not correspond well with the other items pertaining to their intended dimension were dropped (see Supplementary file 2, Table S2). The final 11 motivation dimensions, along with hypotheses on how PBF withdrawal may affect these, are listed in Table 1.

Prior to the analysis, in the few cases where individuals missed a response to an item, missing responses were replaced by imputation of the median value of their responses to other items pertaining to the same dimension. Confirmatory factor analysis, which was carried out in R 3.4.2 using a robust maximum likelihood estimator, indicated a good model fit for the 11-factor model (χ^2 (476) = 816, P = .000; RMSEA = 0.040, P(RMSEA<.05) = 1.000; CFI = 0.902; SRMR = 0.045), confirming that the 34 motivation-related items measured the 11 motivation dimensions as intended. Cronbach alpha was greater than 0.60 for all dimensions with 3 or more items. Factors with more than one item were also tested for measurement invariance across both PBF groups. Measurement invariance testing aims to confirm that the scale has the same measurement properties in different subsamples and scores can therefore meaningfully be compared across samples. Establishing measurement invariance involves a hierarchy of testing, which include tests of weak and strong invariance.[69] Strong invariance was identified for the dimensions: 'conscientiousness,' 'pride' and 'training,' weak invariance for 'organisational culture' and 'tasks,' while only 'availability of equipment/supplies' and 'income reflects effort' were not invariant and differences between subsamples therefore need to be interpreted with caution.

Scores for each dimension were then calculated as unweighted means of responses to items within each dimension, as within each dimension, item-factor loadings were of approximately the same magnitude. Multiple linear regression models with an ordinary least squares estimator as the standard were used to test for significant differences in motivation scores between workers from the non-PBF group and workers in the previous PBF group, controlling for health worker and facility characteristics including: age, gender, health worker cadre, education, years worked in current position, location, type of facility, number of services provided, and presence of the ASSP programme. Table S3 in Supplementary file 3 indicates how different characteristics may have influenced motivation scores, based on the global

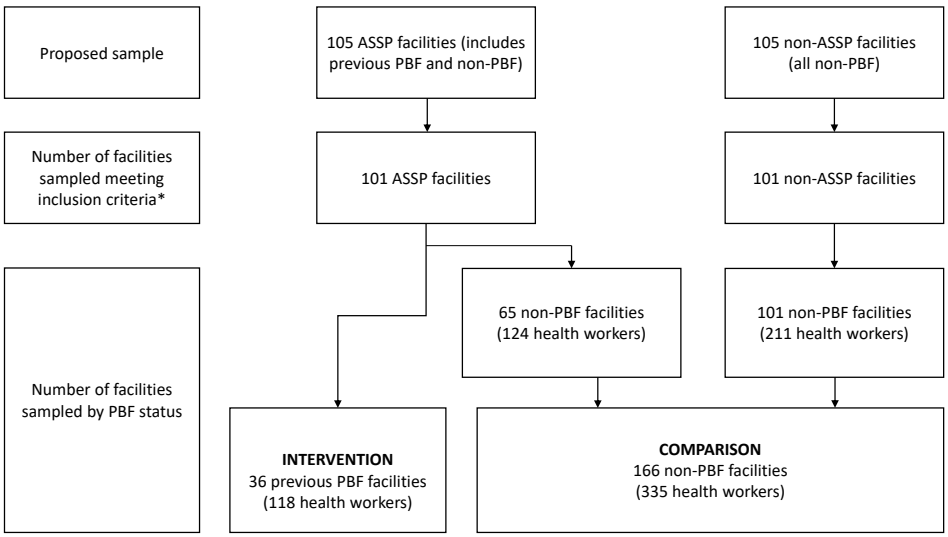

Figure 3. Diagram Showing Sampling of Facilities Under the Baseline Evaluation and the Selection of Intervention and Comparison Groups for This Study. Abbreviations: ASSP, Access to Primary Healthcare (2013-2018); ATH, Access to Healthcare (2008-2013); PBF, Performance-based financing.
* Some surveyed facilities dropped as health workers did not meet inclusion criteria.

Table 1. Final Motivation Dimensions, Link to Franco Framework, and Hypothesis on how PBF Removal May Affect Dimensions

Link to Franco Framework		Dimension (Link to Franco Framework)	Description of Dimension	How Expected Withdrawal of the Donor-Funded Payment May Affect Dimension	Rationale	No. of Items
Determinants of motivation	Individual-level	Conscientious-ness (affective motivation)	Perception of level of discipline, effort and care put into work	Decrease	The introduction of PBF has been shown to increase worker effort[55], as well as reduce absenteeism.[56] The study by Huillery and Seban showed that staff attendance reduced significantly following the withdrawal of PBF.[16] It also reduced in the group where the fixed payment was removed but not to the same extent. We therefore hypothesise that withdrawal of donor funding will lead to reduced conscientiousness.	9
		Pride (affective motivation)	Pride associated with working at the facility	Decrease	According to incentive theory, the introduction of financial rewards may ”crowd out” intrinsic motivation (which includes feelings of pride); this crowding out phenomenon is more likely when employees have high initial levels of intrinsic motivation, eg, when pride in one's work is high and the activity is interesting.[57] The evidence around this is contradictory with respect to PBF.[58] For example, health workers in Bubanza province of Burundi claimed that PBF helped to generate pride and professionalism, while in another Burundian province, the PBF bonus was gradually perceived as a right and a fixed extra which may have led to less intrinsic motivation.[59] In addition, the theory does not predict what happens to intrinsic motivation when the reward is withdrawn, If there is a shift in fundamental motivation composition caused by financial rewards, one may expect pride would remain low rather than increase on withdrawal of the reward.	4
		Extrinsic motivation (cognitive motivation)	Importance health workers place on external rewards	Increase	The importance placed on external rewards by workers receiving PBF has been observed in other studies, and manifest through workers prioritising tasks linked to higher incentives,[15,60,61] or gaming.[15,62] Huillery and Seban also found that more attention was paid to financial motives relative to intrinsic motives following the withdrawal of PBF, and that this was not due to the decrease in worker salary.[16] Therefore, it is expected that extrinsic motivation would increase.	1
		Sufficiency of income (affective motivation)	Degree to which health workers feel like their income is sufficient given their basic monetary needs	Decrease	Although there is no evidence on this from previous studies, it is expected that workers will perceive the sufficiency of income to be less following withdrawal of PBF, as workers would be expected to perform the same tasks for less money overall.	1
		Income reflects effort (affective motivation)	Degree to which health workers feel income received reflects the amount of effort put into work	Decrease	Although there is no evidence on this from previous studies, it is expected that workers will likely perceive their (reduced) income as less appropriate in relation to effort following withdrawal of PBF, as workers would be expected to perform the same tasks for less compensation.	3

Table 1. Continued

Link to Franco Framework		Dimension (Link to Franco Framework)	Description of Dimension	How Expected Withdrawal of the Donor-Funded Payment May Affect Dimension	Rationale	No. of Items
	Organisational level	Training (processes)	Satisfaction with training received and opportunities for training	No effect	The PBF scheme did not include training and so its withdrawal would not be expected to have an effect on workers' satisfaction with training. Levels of training offered would be the same in the previous PBF and non-PBF groups.	3
		Tasks (processes)	Satisfaction with workload and variety of tasks performed	No effect	The withdrawal of the PBF scheme was not accompanied by a change in service organisation or workload. Therefore, no difference in this dimension was expected between the previous PBF and non-PBF groups.	4
		Availability of equipment/ Supplies (resources)	Satisfaction with availability of resources such as equipment, medical supplies and medications	No effect	The PBF scheme did not include increased equipment or supplies and so its withdrawal would not be expected to have an effect on workers' satisfaction with the availability of equipment or supplies. The availability of equipment and supplies was not be expected to vary between the non-PBF and PBF groups.	3
		Organisational culture (organisational culture and human resources management[a])	Satisfaction with relationships with colleagues and management of the facility	Decrease	PBF has been shown to increase levels of collegial support in Mozambique.[63] The potential volatility of PBF was noted to be a source of stress for the heads of facilities in the DRC,[16] so the withdrawal was anticipated to negatively affect health workers' satisfaction with interpersonal relationships at work. PBF has recently been shown by some studies to improve supervision due to the levels of reporting and monitoring required.[63,64] Therefore, it was plausible that this could reverse with the removal of PBF, potentially leading to lower levels of supervision.	4
	Community level	Community relationships (consequence at community level)	Satisfaction with relationships with local leaders in the community	Decrease	In Rwanda, PBF was evaluated to have a positive effect on patient satisfaction,[65] which could improve community relationships with health providers. Yet, the presence of PBF did not have any impact on patient satisfaction according to Huillery and Seban's study.[16] Therefore, withdrawal either expected to have no effect, or result in lower satisfaction from the community.	1
Outcomes	Behaviour	Turnover intention (cognitive motivation)	Intention to leave the facility	Increase	Lack of satisfaction with salary (amongst other job aspects such as career opportunities) has been associated with higher turnover intention in a number of studies.[66-68] Therefore, a reduction in income through PBF withdrawal would be likely to increase staff turnover intention.	1

Abbreviations: PBF, performance-based financing; DRC, Democratic Republic of Congo.

[a] Although the dimensions "Management" and "Organisational Culture" are treated as separate entities within the conceptual framework, they were merged together as items relating to management were worded in a way that they reflected organisational culture.

evidence.

The dependent variable was the score on each dimension. Standard errors (SEs) were clustered at facility-level and ordinary least squares assumptions checked using regression diagnostics.

Qualitative Data

Qualitative data were collected in November 2014 in Kasai Occidental. Two health zones where workers had previously received PBF under the ATH programme were selected purposively, as well as another 2 health zones where workers had never received PBF. Two facilities in each health zone most easily accessible by road were then chosen by the researchers. One female and 1 male nurse were purposively selected from a single facility in each of the 4 health zones, as nurses are the main cadre present in primary care facilities.[70] They were then interviewed subject to consent and meeting a further inclusion criterion, which was to have been based at the same facility for at least 1 year. Workers identified for interview in the non-PBF group were excluded if they had previously received PBF over the past 5 years. In-depth interviews were conducted using a semi-structured interview guide. As the purpose was to help further understand quantitative findings, perceptions and differences in the pre-identified dimensions of motivation were explored. The guide was pre-tested in a health centre before being finalised. The primary author (RM) and an experienced local qualitative researcher familiar with the cultural context performed all 16 interviews in French, and these were audio-recorded subject to participant consent. None of the respondents declined to participate. Interviews lasted one to 2 hours and were undertaken in a private room within facilities to maintain confidentiality.

Analysis

Audio recordings were transcribed in French by the local researcher to maximize accuracy and reviewed by RM, thus enabling both researchers to familiarise themselves with the data prior to coding. Nvivo 10 software was used to manage the qualitative data. Thematic analysis[71,72] was employed using both deductive coding based on the dimensions measured in the quantitative analysis as codes, as well as inductive coding allowing the framework to evolve as interviews were analysed. RM and the local researcher independently initially coded the transcripts and then met for an analysis session which involved discussing the themes generated. During the analysis session, it was clear that the researchers' individual interpretations of the transcripts were very similar; any differences that did occur were resolved by discussion. Results were than compared and contrasted for the previous PBF and non-PBF groups. In writing up the findings, RM translated quotes from French into English.

Results

Quantitative Analysis

A total of 485 workers were interviewed and no one declined to participate in the survey. Three facilities did not meet the inclusion criteria as they were private facilities, and 23 respondents were not classified as health workers. On elimination, this left 453 respondents from 202 facilities for analysis.

Descriptive Statistics

The results of this study compare the PBF group with the non-PBF group; although the latter group comprised both ASSP and non-ASSP facilities, on testing for differences in characteristics, the only significant differences identified were at facility-level for provincial location and the number of services provided, as shown in Table 2. However, there were no differences between health worker characteristics. Given the ASSP programme had not fully commenced implementation when sampling occurred, it is not surprising that characteristics were broadly similar. Hence they were merged into one comparison group for analysis. Table 2 presents the characteristics of sampled facilities, 36 of which were in areas where PBF had been operational. There were significant differences in the numbers of previous PBF and non-PBF facilities between provinces, as most of the previous PBF facilities were based in Maniema and the non-PBF facilities in Equateur. The majority of facilities were located in rural areas, with previous PBF facilities having a significantly higher number of personnel and offering more services compared to non-PBF facilities.

Most health workers surveyed were nurses and male (Table 3). The majority had attained either a primary or secondary level of school education and mean job tenure was almost 9 years. There were no significant differences in the composition of cadres working in previous PBF facilities compared to the non-PBF group, although previous PBF workers were significantly older and more likely to have had a university/post-secondary school education.

Comparison of Motivation Scores Between Previous PBF and Non-PBF Groups

Mean and median composite scores for the dimensions of motivation overall and by PBF status are shown in Table 4. The dimension 'satisfaction with sufficiency of income' had the lowest mean score, whereas the highest mean scores were observed for items related to the dimension 'level of conscientiousness.' The largest difference in means between PBF groups was for 'satisfaction with availability of equipment/supplies' where the non-PBF group scored much higher. Mean and median scores for individual scale items are provided in the supplementary information (Table 1).

Testing for mean differences using regression and controlling for health worker and facility characteristics as described in the methods, we found that health workers in previous PBF facilities scored significantly lower on all dimensions except 'satisfaction with tasks' (no significant differences) and 'level of extrinsic motivation' (marginally significantly higher scores) compared to those in non-PBF facilities. Table 5 summarises the regression results (separate models were run for each dimension).

Qualitative Findings

Sixteen nurses in total were interviewed; 8 in each PBF group, of which 4 were male and 4 were female. Ages of respondents

Table 2. Characteristics of Previous PBF and Non-PBF Facilities Sampled

Facility characteristics	Total (n = 202)	Non-PBF (n = 166)	Previous PBF (n = 36)	Test Statistic, *P* Value
Number of facilities	202	166	36	
Facility location				
Urban	14.8%	12.0%	25.0%	χ^2 (1) = 5.10, *P* = .024
Rural	85.2%	88.0%	75.0%	
Province				
Equateur	33.7%	41.0% (ASSP: 52.3%, non-ASSP: 33.7%)	0.0%	χ^2 (4) = 100.30, *P* < .0001 (Between non-PBF facilities: χ^2 (4) = 39.22, *P* < .0001)
Kasai Occidental	28.2%	32.5% (ASSP: 47.7%, non-ASSP: 22.8%)	8.3%	
Kasai Oriental	6.0%	7.2% (ASSP: 0%, non-ASSP: 11.9%)	0.0%	
Maniema	17.3%	5.4% (ASSP: 0%, non-ASSP: 8.9%)	72.2%	
Province Orientale	14.9%	13.9% (ASSP: 0%, non-ASSP: 22.8%)	19.4%	
Type of facility				
Health centre/health post	85.2%	85.5%	87.0%	χ^2 (1) = 0.28, *P* = .598
Reference health centre	14.4%	14.5%	13.9%	
	Mean	**Mean, SE**	**Mean, SE**	
Number of different services provided by facility (eg, antenatal care, vaccinations etc) (Total n = 194, non-PBF = 160, PBF = 34)	6.97[a]	6.83 ± 0.13[a] ASSP: 6.35 ± 1.50; non-ASSP: 7.16 ± 1.62	7.65 ± 0.22[a]	t = -2.76, *P* = .0064 (Between non-PBF facilities: t = -3.22, *P* = .0015)
Total clinical staff present on the day	6.31	5.45 ± 0.32	10.28 ± 0.83	t = -6.09, *P* < .0001
Population catchment for area (Total n = 163, non-PBF = 135, PBF = 28)	2710.31[a]	2725.64 ± 236.40[a]	2636.39 ± 431.04[a]	t = 0.16, *P* = .8725

Abbreviations: PBF, performance-based financing; SE, standard error; ASSP, Access to Primary Health Care.
[a] N less than total number of facilities for some variables due to missing values.

in each group were of similar ranges and those in previous PBF facilities had worked between 2 and 16 years at the facilities, while in the non-PBF group they had worked between one and 10 years. The sections that follow describe the process of PBF withdrawal and how it may have affected the individual, organisation and community, with due comparison to the non-PBF group where relevant.

Process of Performance-Based Financing Withdrawal

The key complaint from the previous PBF group around the process of withdrawing the PBF scheme was that it had been both abrupt and poorly communicated.

> *"When the new partner removed the prime (PBF scheme) we did not even know that they had removed the prime…we were not informed"* [Respondent 1: Male 42 years, previous PBF].

This led to some resentment from workers in the previous PBF group towards the NGO implementing the ASSP programme. Workers also felt it was the responsibility of international partners to finance them, rather than that of the government.

> *"For me, I would like it to be as before…I wish, there was another partner (NGO/donor) that can take care of us, so we can receive money at the end of each month"* [Respondent 2: Female, 60 years, previous PBF].

Since the removal of the PBF scheme also coincided with a deliberate increase in the user fee tariff, this only served to magnify problems for health facilities. Nurses complained that the community had become used to the previous lower user fee tariff and so were less willing as well as less able to pay the new tariff.

> *"Because people are already used to the free tariff…for them it's a huge problem, even for the maternity here it was free, now it's 1,500FC (1 USD), but for people to pay that, it's becoming quite a problem"* [Respondent 3: Female, 37 years, previous PBF].

Individual Health Worker Effects

"Extrinsic Motivation," "Income Reflects Effort," and "Conscientiousness"

When asked why nurses were motivated to work in their profession, few differences in responses were detected between the previous PBF and the non-PBF groups. Financial incentives appeared to be an important driver of motivation for a substantial share of the health workforce, irrespective of PBF. Against this general importance of financial incentives, respondents from the previous PBF group perceived that when they were receiving donor-funded payments, staff attendance at the facility was high, nurses worked hard and patients were treated in a timely way.

> *"When we were paid, it stimulated us to work a lot and work well, we worked a lot, as we were paid, we had to be able to reach the percentage that was asked… we followed*

Table 3. Demographic Characteristics of Previous PBF and Non-PBF Health Workers

Characteristics	Total (n = 453)	Non-PBF (n = 335)	Previous PBF (n = 118)	Test Statistic, *P* Value
Gender				
Male	69.3%	70.2%	67.0%	χ^2 (1) = 0.14, *P* = .712
Female	31.7%	29.8%	33.0%	
Education				
Primary/secondary school	60.7%	65.1%	48.3%	χ^2 (2) = 11.52, *P* = .003
University/post-secondary school	33.1%	29.6%	43.2%	
Not specified	6.2%	5.4%	8.5%	
Cadre				
Doctor	0.9%	0.6%	1.7%	χ^2 (2) = 1.20, *P* = .549
Nurse	89.8%	90.2%	89.0%	
Other clinical workers	9.3%	9.2%	9.3%	
	Mean	**Mean, SE**	**N, Mean, SE**	
Age	40.01	39.41 ± 0.53	41.64 ± 0.87	t = -2.19, *P* = .029
Number of financial dependents (Total n = 437, non-PBF = 320, PBF = 117)	8.87[a]	8.69 ± 0.26[a]	9.33 ± 0.38[a]	t = -1.29, *P* = .1964
Years worked in current position (Total n = 444, non-PBF = 327, PBF = 117)	8.93[a]	8.68 ± 0.46[a]	9.60 ± 0.87[a]	t = 1.05, *P* = .2956

Abbreviations: PBF, performance-based financing; SE, standard error.
[a] N less than total number of facilities for some variables due to missing values.

Table 4. Mean and Median Composite Scores for Dimensions of Motivation According to PBF Status

Dimension	Overall	Non-PBF	Previous PBF
	Mean, SD (Median)	Mean, SD (Median)	Mean, SD (Median)
Level of conscientiousness	4.10, 0.32 (4.00)	4.13, 0.32 (4.00)	4.04, 0.30 (4.00)
Level of pride	4.02, 0.50 (4.00)	4.07, 0.49 (4.00)	3.87, 0.52 (4.00)
Satisfaction with training	3.50, 0.81 (3.67)	3.59, 0.78 (4.00)	3.26, 0.85 (3.33)
Satisfaction with tasks	3.61, 0.62 (3.75)	3.56, 0.64 (3.75)	3.74, 0.53 (4.00)
Satisfaction with availability of equipment/supplies	2.29, 0.93 (2.00)	2.47, 0.91 (2.33)	1.76, 0.78 (1.67)
Satisfaction with sufficiency of income	1.71, 0.65 (2.00)	1.79, 0.67 (2.00)	1.47, 0.55 (1.00)
Satisfied that income reflects effort	2.03, 0.74 (2.00)	2.17, 0.76 (2.00)	1.64, 0.49 (1.67)
Satisfaction with organisational culture	3.83, 0.55 (4.00)	3.87, 0.55 (4.00)	3.72, 0.55 (4.00)
Satisfaction with community relationships	4.00, 0.72 (4.00)	4.04, 0.74 (4.00)	3.91, 0.64 (4.00)
Level of turnover intention	3.00, 1.25 (4.00)	3.07, 1.21 (4.00)	2.82, 1.34 (3.00)
Level of extrinsic motivation	3.62, 1.07 (4.00)	3.50, 1.07 (4.00)	3.95, 0.99 (4.00)

Abbreviations: PBF, performance-based financing; SD, standard deviation.
Dimensions scored on scale from 1-5. A high mean or median score indicates a higher level for that dimension eg, higher pride.

the (performance) indicators" [Respondent 4: Female 27 years, previous PBF].

Since the withdrawal of donor payments, workers confessed to putting less effort into their work. They reported high levels of staff absenteeism and admitted that they were less punctual in attending the facility, as they felt they were not receiving enough money.

Respondent: "Before (when receiving PBF), I would work even if I had not eaten…Now (after PBF), I don't work a lot. There are even health centres which do 10% out of 100%, they work only 10%...."

Interviewer: "Why do they not work a lot?"

Respondent: "Because of money" [Respondent 4: Female, 27 years, previous PBF].

In particular, nurses felt the amount of effort required by the job was no longer sufficiently rewarded.

"With the work one does, it's a tough job, you can be standing up for a long time during 2 or 3 hours and at the end of the month, what you receive, it's not enough…" [Respondent 5: Female, 48 years, previous PBF].

Stories of corruption were frequent in both groups. Many workers shared tales of other workers stealing medications, equipment and medical supplies, which they then sold privately, and recounted examples of where patients had been overcharged for services. Irrespective of PBF group status, workers did not always see this as wrong, and some considered it justifiable in certain cases. There seemed to be no effect of PBF withdrawal in this regard.

Table 5. Summary of Ordinary Least Squares Regression Results Examining Associations Between PBF Removal and Scores on Motivation Dimensions

Factor	β	*P* Value	95% CI	Constant	Pseudo R^2
Level of conscientiousness	-0.20	<0.001[c]	-0.31 to -0.10	3.76	0.12
Level of pride	-0.43	<0.001[c]	-0.61 to -0.25	3.67	0.10
Satisfaction with training	-0.47	0.004[c]	-0.78 to -0.15	3.74	0.11
Satisfaction with tasks	-0.09	0.40	-0.29 to 0.12	3.33	0.07
Satisfaction with availability of equipment/supplies	-0.62	<0.001[c]	-0.95 to -0.29	2.51	0.19
Satisfaction with sufficiency of income	-0.24	<0.047[b]	-0.48 to -0.00	2.15	0.10
Satisfied that income reflects effort	-0.51	<0.001[c]	-0.78 to -0.23	3.04	0.17
Satisfaction with organisational culture	-0.23	0.020[b]	-0.43 to -0.04	3.74	0.11
Satisfaction with community relationships	-0.44	<0.001[c]	-0.64 to -0.25	4.03	0.07
Level of turnover intention	-0.49	0.045[b]	-0.96 to 0.01	3.14	0.09
Level of extrinsic motivation	0.40	0.058[a]	-0.01 to 0.80	3.19	0.07

Abbreviation: PBF, performance-based financing.
[a] $P \leq .1$, [b] $P \leq .05$, [c] $P \leq .01$.
Controlled for health worker and health facility characteristics. Total number of observations for each regression was 392 due to missing values for certain characteristics.

"He is right because, for example, he has been working for 40 years at the centre…since he started working he has not even been recognised…by anyone or government…he is not paid … he has 8 children. …with the little he has…it is insufficient. He must pay for his rent, for his childrens' school uniforms, to feed his children, why when in this manner he could take money (illegally) from the facility" [Respondent 6: Male, 35 years, non-PBF].

"Sufficiency of Income"

The amount previously received under the PBF scheme had allowed workers to pay for their children's school fees, save money and buy enough food to feed their family well. Following the withdrawal of the PBF scheme, the social circumstances of nurses dramatically changed. Many nurses started to borrow money from their relatives in order to continue to meet their own and their family's basic needs.

"I managed, I sought help from my family to buy a few things to start selling in order to feed myself. With the money from my family, it is not my own money" [Respondent 7: Female, 28 years, previous PBF].

Workers in the non-PBF group felt the amount they received was insufficient, particularly those who had been working for several years but were still not salaried by the state.

"I have worked for almost 3 years in this health centre, and I have never received a salary…which is why I am not happy…I only receive the user fees at the end of the month which we share between us" [Respondent 6: Male, 35 years, non-PBF].

"We work and then and the end of the month, we receive almost nothing" [Respondent 8: Female, 48 years, non-PBF].

Nonetheless, they did not describe any instances of borrowing from other relatives or other behaviours to supplement income as described by the previous PBF group.

Organisation-Level Effects

"Organisational Culture"

The majority of workers in the previous PBF group found that their main source of revenue had shifted from PBF payments to user fees following the withdrawal of PBF. This was problematic insofar as the management and allocation of user fees had become a source of conflict since the withdrawal of the PBF scheme, despite what nurses described as generally good working relationships with their superiors.

"We receive always the user fee because for example, you have 2 patients, you are 10 workers, you have to calculate the percentage, you will have how much? One can say you have 5000 francs (4.5 USD)…How are you going to share that?" [Respondent 7: Female, 28 years, previous PBF].

Workers in non-PBF facilities where user fees had always been the main source of revenue, in contrast, seemed satisfied with the allocation of user fees.

"Management at the centre is good...there is transparency… and the user fees are well managed" [Respondent 6: Male 35 years, non-PBF].

"Turnover Intention"

Although the PBF scheme had initially attracted workers to facilities, shortly after it ceased, there was a mass exodus of workers. Some left clinical work completely to work in commercial activities.

Respondent: "There was even a mutiny of other nurses who left the health zone"
Interviewer: "You know the number of nurses who left?"
Respondent: "Yes"
Interviewer: "How many?"
Respondent: "There were nearly 10 nurses in all of the health zone."
Interviewer: "Why was there a mutiny?"
Respondent: "Because they were not receiving the prime (performance payment), they were going to stay to do what?" [Respondent 9: Male, 30 years, previous PBF].

Workers in the previous PBF group who stayed on in facilities stated this was either because: they had no other options of work available to them; they were waiting for another donor or NGO to start paying them; or they felt a strong commitment to their vocation and enjoyed working in

their profession.

"I am here because I love to treat people. If it wasn't for my desire to work as a nurse, I would return to Katanga province, where life is better compared to here in Kasai" [Respondent 9: Male, 30 years, previous PBF].

Community-Level Effects

"Community Relationships"

As a result of the re-increase in user tariffs following the withdrawal of the PBF scheme, workers perceived that many patients were not attending the previous PBF facilities but were instead seeking care elsewhere, often from traditional healers or private facilities, or not at all.

"Now to have money, to come to the centre, it's always a problem, they take traditional medicines at home" [Respondent 4: Female, 27 years, previous PBF].

It also became clear during interviews that the effects associated with terminating the PBF scheme were not only influencing staff behaviour and motivation but were being felt by the community as well. For example, some nurses remarked that colleagues had become less welcoming and were even rude to patients since donor payments to workers had ceased.

"They say even in front of the patients there, the patient comes, they say 'no, leave there, I can't treat you as I'm not paid'" [Respondent 9: Male 30 years, previous PBF].

Discussion

Based on existing conceptual and empirical work, we developed a scale to measure dimensions of motivation among health workers in the DRC. We then used this scale to assess differences in levels of motivation across each dimension for workers who had recently had PBF withdrawn with workers who had never received PBF, triangulating the results with the findings from qualitative interviews in order to shed more light on how the termination of a PBF scheme had affected worker motivation.

The previous PBF group scored significantly lower on almost all motivation dimensions. Exceptions included 'satisfaction with tasks' where there was no significant difference between groups, and 'level of extrinsic motivation' where workers in the previous PBF group scored higher (marginally significant). Theoretically, a more significant effect with the latter dimension may have been expected; according to "crowding out" theory; the introduction of monetary incentives may alter the composition of worker motivation, with workers becoming more driven by external rewards and less by intrinsic motivation.[35,73]

Qualitative interviews indicated that financial compensation may have been an important dimension of motivation for both groups. The quantitative analysis showed that workers in the previous PBF group had significantly lower scores for the dimension 'satisfaction with sufficiency of income.' A likely reason behind the lower scores is that during PBF, workers were guaranteed a certain level of income each month (at least $75) but since the withdrawal of the PBF scheme, the amount received was less predictable as it was dependent on the amount of user fees collected; Fox et al found the monthly variation in user fees received by facilities in Katanga province of DRC to be considerable.[26] A previous study by the authors examining the different income levels and sources of health workers using data from the same health worker and health facility surveys confirms that the income derived from user fees was on average much lower than the PBF payments.[70] However, despite some differences in the various sources of income received, the total mean and median income received for both the previous PBF and non-PBF groups were still similar (see Supplementary file 4, Table S4).

Nonetheless, workers in the previous PBF group seemed unable to have the same lifestyle they had enjoyed before the withdrawal of PBF. Staff were unhappy with their lower level of compensation post PBF, leading to significantly lower scores on 'satisfaction that income reflects effort'; their conscientiousness deteriorated as a result, with reports of high levels of staff absenteeism and poor attitudes towards patients. Such effects are potentially very destructive and undermine the effective functioning of the health system. The reasons for the significant differences between groups for the dimensions 'satisfaction with training,' 'satisfaction with tasks,' 'level of pride,' and 'satisfaction with availability of equipment/supplies' yielded by the quantitative analysis, however, could not be identified during qualitative interviews.

Although it could not be confirmed quantitatively, respondents described a reduction in the number of staff working in facilities following the cessation of incentives. Yet, contrary to interviews and the initial hypothesis, the previous PBF group scored lower on 'level of turnover intention.' The average tenure of workers in the previous PBF group was also not significantly different to that of the non-PBF group. It may be that those workers with a high turnover intention in the previous PBF group had already left facilities soon after PBF removal, so those interviewed were more committed to staying. Remaining staff had to rely on user fees received at the facility-level as their main source of income, the distribution of which was more often a source of dispute in previous PBF facilities compared to non-PBF facilities. This was perhaps because staff from non-PBF facilities had not experienced the same recent loss of income and so were well accustomed to the income received from user fees. In parallel, relationships between previous PBF workers and the local community became strained, as the implementing partners of ASSP had introduced higher user fees in order to help substitute performance payments. According to nurses in the previous PBF group, the community were less likely to access care from facilities as user fees had increased. Furthermore, in some workers, the resentment towards receiving a reduced income manifested itself in their attitudes towards patients. This breakdown in the interface between the community and health workers was consistent with the quantitative analysis where previous PBF workers had significantly lowers scores for 'satisfaction with community relationships.'

The findings in this study do concur with another study in the DRC which found that the withdrawal of donor-funded payments did reduce the overall motivation of workers.[16] However, in this study we were able to measure differences between a group having had PBF withdrawn with a "control"

group across several different dimensions of motivation and employed in-depth qualitative investigation to yield a more in-depth understanding around the differences observed. There are few other reports in the wider literature which examine the withdrawal of donor-funded payments in relation to performance and motivation. A DFID-supported health programme in Liberia attempted to withdraw the payment of salary supplements to health workers. Following this, clinic staff began charging high fees for services and sold drugs to private clinics to enhance their income, necessitating the eventual reinstatement of financial incentives. Although anecdotes concerning unethical behaviour such as stealing were common in both groups in our study, it was likely to have been under-reported; given the small number of interviews conducted, we were unable to draw any strong conclusions as to whether this had changed in the previous PBF group. In the United States and United Kingdom, the cessation of performance payments did not appear to adversely affect performance or quality of care.[74,75] Nevertheless, unlike this study, they were unable to indicate any differences observed with a control group. In addition, the contribution of performance payments compared to base salaries and other income sources is likely to be far lower in high-income countries compared with low-income countries, limiting the generalisability of the findings.

The programme's decision to terminate the PBF scheme was made on the premise that the government is responsible for public sector personnel remuneration, and that PBF funded by donors is not a sustainable solution. However, in the absence of any structural improvement in government payments to workers, immediate service needs still have to be met. Important lessons from this experience include: more careful thinking around the implications of withdrawing donor-funding for workers and their social circumstances, and ensuring that there is an effective communication strategy with workers and communities on such programmatic changes to mitigate any adverse reactions. Alternative, acceptable measures should also be instituted which still make it attractive for workers to stay and provide high quality services at facilities. As indicated by previous studies, workers are not exclusively motivated by financial factors.[8] Attention to non-financial dimensions such as the 'satisfaction with the availability of equipment/supplies' and 'satisfaction with training' which were rated low in this study could serve to enhance motivation. Country governments and their international health partners should also consider whether the short-term advantages of introducing additional health worker payments outweigh the potential adverse long-term consequences if the chances of it being sustained in the long-term for a given context are low. In designing any future PBF schemes, a realistic and well thought out exit strategy should be planned from the beginning to prevent long-term dependence, and the existing financial environment of workers should also be reviewed to ensure that payments are not distortionary in the context of other payments received. For example, one way of ensuring PBF is more structurally and financially sustainable, is to blend it with other existing payment mechanisms (such as salaries)[76] as opposed to implementing it as a stand-alone, vertical programme, as was the case here. Another study in the DRC found that health workers appeared to value salaries more than PBF payments,[26] and so efforts to ensure all legitimate workers are remunerated by the state should be prioritised.[77] Furthermore, with respect to PBF, donors may consider what specific sources of funds would be used for a PBF scheme in the event their funding cannot be sustained.

A strength of this study is that it supplemented the quantitative data with qualitative insights in order to corroborate and explain findings. We developed a motivation measurement scale customised to workers in the DRC, which may be of use to future studies wishing to measure the effects of different interventions on motivation. In doing so, we chose a proxy-based approach to operationalising motivation, in line with many prior studies. We acknowledge, however, that such an approach relies on a number of assumptions about relationships between proxies and motivation itself about which we cannot be fully certain.

There were several limitations to the study, the main limitation being it was a cross-sectional study making it difficult to causally attribute the lower motivation levels observed in the previous PBF group to the cessation of the PBF scheme. It is possible that the findings demonstrate that the results of PBF are not sustained when funds are withdrawn, and that motivation levels in this group had returned to baseline levels (pre-PBF). Workers from previous PBF facilities also had some significantly different characteristics compared to non-PBF workers; in particular, many of the PBF and non-PBF workers were located in facilities in different provinces. Therefore, the differences in context could also explain some of the differences in motivation observed. This was unavoidable as coverage of the PBF model was determined by the geographical focus of the previous health programme. To the extent possible differences in characteristics were controlled for in the quantitative analysis, however.

By the time the quantitative and qualitative data were collected, performance payments had stopped for one month and 8 months respectively. According to interviews, many of the original workers had subsequently left following the removal of PBF. Stronger reactions may therefore have been observed had interviews occurred immediately after the withdrawal, however, of concern is that discontent persisted amongst the previous PBF group long afterwards. Furthermore, the study was unable to disentangle the influence of removing the fixed payment from the performance-based component. This was investigated previously by Huillery and Seban, where they found the removal of a performance-related payment compared with a fixed payment of the same amount had a more profound negative impact on motivation.[16]

The study was subject to other biases, including social desirability bias where respondents' perceptions of what constitutes an acceptable answer or what they think the researcher wishes to hear may have influenced their responses. The analysis could have been strengthened had we been able to link the motivation scores to performance, however data on the latter was not captured. Due to resource constraints, qualitative interviews were only conducted in one province so

may not be generalisable to the other sampled provinces. Kasai Occidental province was chosen because it would be easiest to access both workers who had either previously been exposed to the PBF model or never received PBF. However, a limitation is that the number of qualitative interviews undertaken overall was small. Although there are no established guidelines on sample sizes for qualitative interviews, the literature suggests between 20 and 50 interviews are often needed.[78,79] We were limited in the number of interviews possible by the realities of a very difficult context (security, accessibility, availability of staff).

Finally, our confidence in comparing scores for dimensions exhibiting strong measurement invariance across PBF groups was higher compared to those constructs which showed weak or no invariance; the small sample of workers in the previous PBF groups would have affected the precision of measurement invariance testing.[33]

Conclusion

Programmes unable to sustain donor-funded payments to health workers should consider the consequences withdrawal could have for health worker motivation, and institute measures to mitigate against any adverse effects. Governments and donors designing new PBF schemes should develop realistic exit strategies if they are unlikely to be able to sustain these schemes over the longer-term.

Acknowledgements

We would like to acknowledge the contribution of Dr Natasha Palmer from the London School of Hygiene and Tropical Medicine, London, UK to the design of the study. We also thank the Kinshasa School of Public Health, Kinshasa, Democratic Republic of the Congo and Ann-Marie Yongho and Paul-Samson Lusamba-Dikassa of Tulane International (TILLC) who oversaw the implementation of the health facility and health workers surveys, and Cele Manianga who assisted the collection of data for the qualitative component. Finally, we would like to thank Gavin Cochrane for his help in producing the figures.

Ethical issues

The study received ethical approval from the Tulane University Institutional Review Board (Reference number: 14-633280), the Kinshasa School of Public Health Ethics Committee (Reference number: ESP/CE/024/2014), and the London School of Hygiene and Tropical Medicine Research Ethics Committee (Reference number: 8475). Informed written consent was obtained from all participating healthcare providers.

Competing interests

The lead author has recently been appointed as a health adviser for DFID. DFID funded the health systems strengthening programme described in the article. No other competing interests have been declared.

Authors' contributions

RM conceived the study, and designed it in collaboration with JB and DRH. JL assisted RM in the analysis and interpretation of the quantitative data. RM also designed, collected, and analysed the qualitative data of the study. SMJ and JB helped with the interpretation of the qualitative data. RM drafted the initial manuscript, and all authors helped to revise it critically for intellectual content. All authors read and approved the final the manuscript.

Funding

This work was supported by the UK Government's Department for International Development.

Endnotes

[1] In July 2015, the provinces of the DRC underwent 'decoupage,' whereby the DRC's 11 provinces were further subdivided into 26. This paper refers to the provinces prior to decoupage.

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Supplementary files

Supplementary files 1, 2, 3, and 4 contain Tables S1, S2, S3 and S4, respectively.

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Supplementary files for research paper 3

Supplementary Table 1: Dimensions and distribution of item scores overall and by PBF status.

		Overall	Non PBF	Previous PBF	Total number obs
Dimension	**Item**	**Mean, SD (median)**	**Mean, SD (median)**	**Mean, SD (median)**	
Conscientiousness	*I am confident about my ability to handle my work*	4.21, 0.46 (4)	4.23, 0.50 (4)	4.14, 0.35 (4)	452
	I effectively cope with any new challenges that occur in my work life	4.06, 0.50 (4)	4.09, (0.50) (4)	3.99, 0.50 (4)	452
	At work you can always depend on me	4.13, 0.46 (4)	4.13, 0.46 (4)	4.06, 0.46 (4)	452
	My work is always of high quality	4.02, 0.58 (4)	4.05, 0.57 (4)	3.93, 0.60 (4)	452
	I am a hard worker	4.15, 0.60 (4)	4.16, 0.56 (4)	4.10, 0.70 (4)	452
	I always arrive on time to work	4.05, 0.66 (4)	4.07, 0.67 (4)	3.99, 0.63 (4)	452
	I spend my time at work on work-related activities	4.13, 0.41 (4)	4.15, 0.39 (4)	4.08, 0.46 (4)	452
	I am careful not to make mistakes at work	4.18, 0.44 (4)	4.21, 0.47 (4)	4.12, 0.32 (4)	452
	When I am not sure how to treat a patient's condition I look for information or ask for advice	4.12, 0.50 (4)	4.14, 0.52 (4)	4.08, 0.42 (4)	452
	I do things which need to be done without being asked or told	4.06, 0.57 (4)	4.09, 0.53 (4)	3.97, 0.67 (4)	452
Pride	*This facility has a good reputation in the community*	4.12, 0.69 (4)	4.18, 0.67 (4)	3.95, 0.71 (4)	451
	It is a source of pride to work here	3.92, 0.80 (4)	3.96, 0.79 (4)	3.80, 0.69 (4)	451
	I feel I am doing something important in this work	3.95, 0.72 (4)	4.00, 0.70 (4)	3.80, 0.76 (4)	451
	The other workers are proud to deliver good care to patients	4.08, 0.62 (4)	4.13, 0.62 (4)	3.95, 0.61 (4)	451
Training	*How do you rate your opportunities to upgrade your skills and knowledge?*	3.39, 1.10 (4)	3.51, 1.06 (4)	3.06, 1.13 (3)	452
	How do you rate your ability to put into practice what you have learned from training?	3.84, 0.86 (4)	3.95, 0.75 (4)	3.54, 1.06 (4)	452
	How do you rate how you and your colleagues are chosen to attend training?	3.29, 1.05 (4)	3.38, 1.02 (4)	3.03, 1.09 (3)	452
	I have received sufficient training to do my job well	3.79, 0.96 (4)	3.83, 0.95 (4)	3.68, 1.00 (4)	451
Tasks	*How do you rate the description of your job role and tasks?*	3.76, 0.85 (4)	3.75, 0.88 (4)	3.80, 0.75 (4)	453
	How do you rate satisfaction with your workload?	3.29, 1.03 (4)	3.19, 1.06 (4)	3.60, 0.87 (4)	453
	How do you rate the division of work between you and your colleagues?	3.71, 0.79 (4)	3.68, 0.81 (4)	3.79, 0.71 (4)	443
	How do you rate the division of work between caring for patients and other tasks?	3.67, 0.81 (4)	3.59, 0.87 (4)	3.86, 0.57 (4)	453
	How do you rate the variety of your tasks?	3.67, 0.81 (4)	3.64, 0.85 (4)	3.75, 0.67 (4)	453
Availability	*How do you rate the availability of*	2.34, 1.17	2.59, 1.17	1.60, 0.81	453

of equipment /supplies	*medicines in the health facility?*	(2)	(2)	(1)	
	How do you rate the availability of equipment in the health facility?	2.07, 1.03 (2)	2.16, 1.02 (2)	1.81, 1.03 (1.5)	452
	How do you rate the availability of medical supplies in the health facility?	2.44, 1.16 (2)	2.64, 1.18 (2)	1.88, 0.90 (2)	453
Income reflects effort	*The effort that we at this facility put into this job is reflected in our pay*	2.20, 1.02 (2)	2.37, 1.08 (2)	1.74, 0.59 (2)	451
	My job offers adequate pay compared with similar jobs	2.09, 0.93 (2)	2.24, 0.99 (2)	1.64, 0.55 (2)	451
	The income I receive is a fair reflection of my skills, knowledge and training	1.80, 0.71 (2)	1.89, 0.73 (2)	1.54, 0.56 (2)	448
Sufficiency of income	*The income that I receive from working at this facility more than covers my basic needs such as food, transport, and accommodation*	1.71, 0.65 (2)	1.79, 0.67 (2)	1.47, 0.55 (1)	448
Organizatio n-al culture	*How do you rate your working relationships with upper-level staff?*	3.93, 0.73 (4)	3.96, 0.75 (4)	3.84, 0.68 (4)	453
	How do you rate your working relationship with colleagues?	4.09, 0.66 (4)	4.15, 0.63 (4)	3.92, 0.71 (4)	453
	How do you rate the transparency of the management of financial resources by the facility?	3.49, 1.04 (4)	3.49, 1.07 (4)	3.48, 0.98 (4)	452
	How do you rate your participation in decision-making to resolve problems in the facility?	3.80, 0.76 (4)	3.85, 0.76 (4)	3.65, 0.73 (4)	453
Community relationship s	*How do your rate your relationship with local leaders in the community*	4.00, 0.72 (4)	4.04, 0.74 (4)	3.91, 0.64 (4)	451
Turnover intention	*I intend to leave this facility as soon as I can find another position*	3.00, 1.25 (4)	3.07, 1.21 (4)	2.82, 1.34 (3)	449
Extrinsic motivation	*I only do this job so that I get paid at the end of the month*	3.62, 1.07 (4)	3.50, 1.07 (4)	3.95, 0.99 (4)	451

Supplementary Table 2: Original survey items and explanation around why certain items were dropped from the confirmatory factor analysis

Dimension	Question	Item included (Y/N)	Reason why item was dropped
Income reflects effort	The effort that we at this facility put into this job is reflected in our pay	Y	
	My job offers adequate pay compared with similar jobs	Y	
	The income I receive is a fair reflection of my skills, knowledge and training	Y	
	How do you rate your salary with respect to your workload?	N	High number of not applicable answers received as salaries not given to all staff. This was identified post distribution of the survey.
Sufficiency of income	The income that I receive from working at this facility more than covers my basic needs such as food, transport, and accommodation	Y	
	With this job I have worries about how to support myself and my family	N	Did not group well with sufficiency of income dimension when performing psychometric item analysis.
	How do you rate your salary with respect to your competencies/ability?	N	High number of not applicable answers received as salaries not given to all staff. This was identified post distribution of the survey.
	How do you rate your salary with respect to your allowances (travel allowance, bonus, medical care)?	N	High number of not applicable answers received as salaries not given to all staff. This was identified post distribution of the survey.
	How satisfied are you with the system of compensation/motivation of personnel?	N	Question was deemed to be too vague and did not fit theoretically with the proposed dimension.
Availability of equipment/supplies	How do you rate the availability of medicines in the facility?	Y	
	How do you rate the availability of equipment in the facility?	Y	
	How do you rate the availability of medical supplies in the facility?	Y	
	How do you rate the physical condition of the facility building?	N	This question was to be grouped with questions above under a wider dimension of "resources". However, responses were very different compared to other items under resources (now availability of equipment/medical supplies) so was not included.

	How do you rate the number of personnel working in the facility?	N	This question was to be grouped with questions above under a wider dimension of "resources". However, responses were very different compared to other items under resources (now availability of equipment/medical supplies) so was not included.
Training	How do you rate your ability to put into practice what have you learned from training?	Y	
	How do you rate how you and your colleagues are chosen to attend training?	Y	
	How do you rate your opportunities to upgrade your skills and knowledge?	Y	
	I have received sufficient training to be able to perform my job well	Y	
Tasks	How do you rate your satisfaction with your workload?	Y	
	How do you rate the division of work between you and your colleagues?	Y	
	How do you rate the division of work between caring for patients and other tasks?	Y	
	How do you rate the variety of your tasks?	Y	
	How do you rate the description of your responsibilities and your tasks?	Y	
	How do you rate the flexibility with attendance and work hours?	N	The tasks dimension was initially wider to include questions on workload. However, this item did not correspond well with other items under the "tasks" dimension when measuring the mean distribution of responses and cronbach's alpha.
	How do you rate the help you receive from other members of your team?	N	The tasks dimension was initially wider to include questions on workload. However, this item did not correspond well with other items under the "tasks" dimension when measuring the mean distribution of responses and cronbach's alpha.
	How do you rate your level of responsibility?	N	Did not correspond well with other items under "tasks" dimension when measuring mean distribution of responses and cronbach alpha.

	How do you rate the stability of your contract?	N	Dropped due to high level of not applicable responses, as formal contracts did not tend to operate in health facilities. Also, did not fit well conceptually with the dimension.
Pride	This facility has a good reputation in the community	Y	
	It is a source of pride to get a job at this facility	Y	
	In this facility, providers are proud to deliver good services to patients	Y	
	I feel that I am doing something important in this job	Y	
Community relationships	How do you rate your relationship with local leaders of the community?	Y	
	How do you rate your ability to satisfy the needs of the community?	N	Initially belonged to a differently defined dimension called 'community factors' – but items were too disparate and did not group well in the analysis – so decision to change the dimension to community relationships.
	How do you rate your safety and security to live and practice in the community	N	Initially belonged to a differently defined dimension called 'community factors' – but items were too disparate and did not group well in the analysis – so decision to change the dimension to community relationships
	How do you rate your respect from the community?	N	Initially belonged to a differently defined dimension called 'community factors' – but items were too disparate and did not group well in the analysis – so decision to change the dimension to community relationships
Organisational culture	How do you rate your working relationships with upper-level staff?	Y	
	How do you rate your professional relationships with your colleagues?	Y	
	How do you rate the transparency of the management of financial resources by the facility?	Y	
	How do you rate your involvement in decisions to resolve problems within the facility?	Y	
	How do you rate the level of respect accorded to you by	N	High number of not applicable answers received, as

	your internal supervisors in the facility?		sometimes the most senior member of staff was interviewed at the facility.
	How do you rate the management of the facility by the MSP or health zone office?	N	High number of not applicable answers received, as not all staff interacted with health office officials.
Conscientiousness	I spend my time at work on work-related activities	Y	
	I do things which need to be done without being asked or told	Y	
	When I am not sure how to treat a patient's condition I look for information or ask for advice	Y	
	I am careful not to make errors at work	Y	
	I am a hard worker	Y	
	My work is consistently of a high quality	Y	
	At work you can always depend on me	Y	
	I effectively cope with any new challenges that occur in my work life	Y	
	I am confident about my ability to handle my work	Y	
	I always arrive on time to work	Y	
	I am rarely absent from work	N	Did not correspond well with other items under "conscientiousness" dimension when measuring mean distribution of responses and cronbach alpha.
Extrinsic motivation	I only do this job so that I get paid at the end of the month	Y	
Turnover intention	I intend to leave this facility as soon as I can find another position	Y	
Respect /recognition	How do you rate the level of respect accorded to you by your external supervisors in the facility?	N	Partially captured under organisational culture, and did not form a stable construct on its own.
	How do you rate the recognition by your superiors for a job well done?	N	Partially captured under organisational culture, and did not form a stable construct on its own.
Self-efficacy	I feel that I have control of things concerning my work	N	Initially included under a different dimension of self-efficacy. However, this dimension was dropped as cronbach alpha was poor when grouped with other items presumed to be measuring self-efficacy (indicating very different scoring so potentially

			not measuring the same construct).
	I feel that at work things are going the way I would like them to	N	Initially included under a different dimension of self-efficacy. However, this dimension was dropped as cronbach alpha was poor when grouped with other items presumed to be measuring self-efficacy (indicating very different scoring so potentially not measuring the same construct).
No pre-defined dimension (added by development partners)	I would recommend this profession to my children	N	This item was suggested by development partners but did not correspond with any pre-defined dimension.
	How do you rate your opportunities for promotion?	N	This item was suggested by development partners but did not correspond with any pre-defined dimension.

In summary, 60 items were initially included in the questionnaire. Two of the items which were added by development partners, were not hypothesised to be associated with a dimension a priori, so were not included in the analysis. This left 58 items for confirmatory factor analysis.

However, on initial analysis of the data, it was found that six of the items had a high level of not-applicable responses (greater than 10%). On further review, it was identified that they may not have been applicable to all workers e.g. not all workers received a government salary, so these items were dropped.

For the rest of the items, psychometric item analysis examining item distributions, summary statistics and correlation patterns was undertaken. This involved checking mean distribution and standard deviation of item scores, as well as cronbach's alpha. Ten items did not correspond well with other items pertaining to their intended dimension and so were dropped from the analysis. A further two dimensions, namely 'self-efficacy' and 'respect/recognition' were dropped as well as they did not perform well as constructs in the confirmatory factor analysis.

Supplementary Table 3: Hypothesised relationship of different demographic and health facility characteristics with health worker motivation

Variables	Hypothesised relationship with motivation
Age	In a study by Prytherch et al.,[1] older respondents were significantly more positive in their responses to questions assessing their level of motivation. The authors postulated that older workers may receive greater respect and appreciation for their work from the community and colleagues given their greater level of experience. In other studies, older workers have been found to be more committed to working in the facility than younger workers, and more satisfied with their work overall.[2,3]
Sex	A study in Zambia found female public sector health workers to be less satisfied than male workers.[4] However, another study found no difference in job satisfaction between males and females when controlling for other socio-demographic variables.[2]
Number of dependents	In Tanzania, it was found that the more dependents a health worker had, the more positive they were in response to questions concerning their motivation.[1] This may be because the income of workers becomes more important as their number of dependents increases making workers less likely to respond negatively to these questions. Workers with children have also been found to be significantly more committed to staying in a facility compared to workers without children.[3]
Urban-rural status	Opportunities, for example for career development, may be greater in urban areas compared to rural areas which could have an effect on motivation.[5] Developing countries often experience 'urban bias' whereby urban areas experience a greater provision of services and investment compared to rural areas.[6] The relative underinvestment in rural areas may serve to reduce the motivation of workers.
Total number of staff delivering healthcare present on the day	The number of staff working in a facility at a given time will affect the distribution of tasks and potentially the workload of personnel. This may in turn affect health worker motivation. Workload is an important motivating factor, particularly in the context of limited resources.[7]
Number of services offered	The more services offered by a facility, the greater the potential for workers to use a variety of skills and have responsibility for certain tasks. This may have the potential to affect motivation, according to the job characteristics model developed by Hackman and Oldham.[8]
Distance of the facility from the village	Distance of the facility from the village has been used here as a proxy for the remoteness of facilities. Globally, it is challenging to recruit and retain workers in remote areas .[9] Nonetheless, Stilwell found that health workers based in remote areas of Zimbabwe displayed a high level of motivation despite a lack of financial incentives compared to workers in less remote areas .[10]
Education	Educational background has been shown to be a predictor of intention to leave a health facility.[11]
Years in position	In Tanzania, respondents who had been working for longer tended to be less critical about the management of the facility. This may be due to their understanding and acceptance over time around the constraints faced by facilities.[1] However, another study in Afghanistan showed that workers who had been working longer at a facility, had a lower intent to stay than those who had been working for a shorter period of time.[3]
Type of facility	A cross-country analysis of Tanzania, South Africa and Malawi indicated that workers in public hospitals were less satisfied compared to workers in clinics or health centres.[2] Reference facilities in the DRC are bigger than health centres and offer a broader range of services which may affect the motivation of workers.
Total population of the village	The greater the population served by a facility may result in more patients accessing the facility. The increased workload may in turn affect staff motivation.

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Supplementary Table 4: Proportion of nurses receiving sources of income and mean and median values of income received by PBF status

	Workers not receiving PBF (n=302)			Workers receiving PBF (n=105)		
Source of income	**Overall proportion of workers who received source of income**	**Median income per month among those receiving income in USD (IQR)**	**Mean income per month among those receiving income in USD (Standard Error)**	**Overall proportion of workers who received source of income**	**Median income per month among those receiving income in USD (IQR)**	**Mean income per month among those receiving income in USD (Standard Error)**
Payments from government						
Salary from government	33.4%	42.25 (22-75)	53.43 (49.78)	24.8%	70.16 (47-85)	76.06 (89.92)
Occupational risk allowance from government	50.0%	12.89 (10-30)	46.60 (86.32)	61.0%	11.92 (11-13)	14.43 (11.79)
Payments from other sources						
User fees	69.1%	28.71 (16-68)	96.93 (185.10)	90.5%	10.83 (8-16)	14.85 (15.69)
Gifts/informal payments from patients	15.6%	3.25 (2-11)	9.26 (11.66)	20.0%	5.42 (3-8)	7.58 (7.25)
Per diems	55.2%	4.06 (2-8)	9.30 (29.47)	41.9%	4.11 (1-6)	5.78 (6.19)
Income from private clinical practice	5.6%	17.61 (5-22)	28.13 (33.69)	11.4%	21.67 (18-62)	40.90 (34.61)
Income from supplemental (non-clinical) activities	38.9%	86.67 (54-173)	142.75 (151.36)	69.2%	43.34 (27-87)	91.46 (154.97)
Total income	N/A	84.57 (33-199)	178.96 (244.53)	N/A	84.67 (40-135)	118.63 (167.35)

N.B. For the occupational risk allowance, one outlier income was dropped from the analysis; no outliers were detected for any other income amount.

The table above illustrates differences in the level of income received by nurses who previously PBF compared to those who did not. The proportion of nurses receiving salaries was lower for those who received donor-funding in the past, but median and mean amounts were higher. Nurses who had previously received PBF were more likely to receive income from user fees, albeit a smaller median and mean amount compared with those who had not been receiving donor payments. They were also more likely to engage in private clinical practice and other non-clinical activities to supplement their income. Despite the differences, however, both median and mean overall total income were very similar for both groups. The minimum daily wage in the DRC is $1.83, or $298 per year.[1]

[1] US Department of State. Bureaucracy of Democracy, Human Rights, and Labor. "Country Reports on Human Rights Practices for 2017. *Available at:* https://www.state.gov/j/drl/rls/hrrpt/humanrightsreport/index.htm#wrapper. *Updated 19 January 2019. Accessed: 19 January 2019.*

7. Process evaluation of an intervention to improve government payments to health workers in the DRC

7.1 Introduction

Chapter 5 has shown the remuneration of health workers in the DRC is complex and fragmented. Primary care workers receive varying amounts of income from a multitude of different sources. With respect to government payments, only a minority receive a salary, while just over half of workers sampled in the study were paid an occupational risk allowance. Yet, despite the significant contributions received from patients and donors as a proportion of their total income, the qualitative analysis revealed that workers most valued government payments, as they offered more stability compared to donor-funded sources.

In chapter 6, financial compensation was found to be an important dimension of motivation to most workers. Furthermore, it revealed the negative consequences for their motivation when donor funding is withdrawn, particularly in a context where many workers receive either inadequate or no payments from government.

This chapter describes a process evaluation of an intervention which was primarily designed to improve the proportion of workers paid by government in the DRC. Such an intervention, if successful, could have significant implications for health worker motivation, given the findings from chapters 5 and 6.

Three research papers are included in this chapter. The first paper goes into detail on how the theory of change for the process evaluation was co-developed with other stakeholders. Similar to chapter 6, I have reflected on the process in order to capture any lessons learnt which could be of value to others using theories of change in their research. This paper is presented in the format of a publication in BMJ Global Health.

The second paper is a short commentary also published in BMJ Global Health which provides the justification for the intervention that is being evaluated and contrasts this with PBF, exploring the reasons why donors tend to favour PBF over structural changes.

The third paper gives a full account of the process evaluation, which applied a framework of implementation fidelity in order to explore the degree to which the planned intervention was adhered to, and any contextual factors which may have moderated implementation. This paper is presented in the format of a publication which has been submitted to the journal Implementation Science.

7.2 Research paper 4

(Cover sheet attached)

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SECTION A – Student Details

Student ID Number	215918	**Title**	Dr
First Name(s)	Rishma		
Surname/Family Name	Maini		
Thesis Title	Health workers in the Democratic Republic of Congo: an exploration of their motivation, incentives, and the effects of an intervention to improve their remuneration by government		
Primary Supervisor	Josephine Borghi		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

SECTION B – Paper already published

Where was the work published?	BMJ Global Health		
When was the work published?	3 January 2018		
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For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I facilitated the workshops referred to in the paper and drafted the initial manuscript. I led on revisions received from JB and SM-J to finalise the manuscript for publication.

SECTION E

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Supervisor Signature	[redacted]
Date	30/09/2019

BMJ Global Health

How to and how not to develop a theory of change to evaluate a complex intervention: reflections on an experience in the Democratic Republic of Congo

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To cite: Maini R, Mounier-Jack S, Borghi J. How to and how not to develop a theory of change to evaluate a complex intervention: reflections on an experience in the Democratic Republic of Congo. *BMJ Glob Health* 2018;**3**:e000617. doi:10.1136/bmjgh-2017-000617

Handling editor Seye Abimbola

Received 20 October 2017
Revised 23 November 2017
Accepted 12 December 2017

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ABSTRACT

Theories of change (ToCs) describe how interventions can bring about long-term outcomes through a logical sequence of intermediate outcomes and have been used to design and measure the impact of public health programmes in several countries. In recognition of their capacity to provide a framework for monitoring and evaluation, they are being increasingly employed in the development sector. The construction of a ToC typically occurs through a consultative process, requiring stakeholders to reflect on how their programmes can bring about change. ToCs help make explicit any underlying assumptions, acknowledge the role of context and provide evidence to justify the chain of causal pathways. However, while much literature exists on how to develop a ToC with respect to interventions in theory, there is comparatively little reflection on applying it in practice to complex interventions in the health sector. This paper describes the initial process of developing a ToC to inform the design of an evaluation of a complex intervention aiming to improve government payments to health workers in the Democratic Republic of Congo. Lessons learnt include: the need for the ToC to understand how the intervention produces effects on the wider system and having broad stakeholder engagement at the outset to maximise chances of the intervention's success and ensure ownership. Power relationships between stakeholders may also affect the ToC discourse but can be minimised by having an independent facilitator. We hope these insights are of use to other global public health practitioners using this approach to evaluate complex interventions.

Key questions

What is already known about this topic?

- Theories of change (ToCs) help to articulate the change process within complex interventions.
- Their use has increased exponentially in the development sector.

What are the new findings?

- A number of practical issues to ensure the successful formulation of a ToC were identified and included:
  - The need to consider how a complex intervention may interact with the wider system rather than being considered only in the context of one sector.
  - The importance of identifying and ensuring adequate input from all of the relevant stakeholders.
  - The need to involve all stakeholders in the conception of the ToC to encourage ownership.
  - The role of the facilitator as an objective broker of power relationships between stakeholders.

Recommendations for policy

- These practical issues may help partners to use the ToC approach to its full potential, creating space for critical reflection rather than being an illusory process.

INTRODUCTION

Complex interventions are commonly defined in the literature as interventions that comprise multiple components acting both independently and in conjunction with one another.[1 2] Other characteristics contributing to their complexity include: the number and difficulty of behaviours required by those delivering or receiving the intervention, number and variability of outcomes and the degree of flexibility permitted within the intervention.[3] A theory of change (ToC) approach can be an effective way to evaluate such interventions by taking into account implementation aspects, mechanisms of impact and the effects of context.[4] When a complex health systems intervention is being evaluated, it is necessary to understand how the intervention relates to and interacts with components of the system to produce an effect. In applying this 'systems thinking' approach,

multiple points of view or perspectives need to be sought.[5]

Originally developed by Weiss,[6] ToCs articulate the change process within interventions and describe the sequence of events linking intervention activities to their long-term outcomes.[7] They make explicit the conditions and assumptions required to enable change[8 9] and acknowledge the role of context in influencing the process. Diagrams are often used to depict a ToC as most complex interventions consist of elements interacting in a non-linear fashion, with indirect causal pathways and feedback loops. This is in contrast to logic models and logical frameworks, which tend to be more rigid and linear in outlining the inputs, processes, outputs and outcomes of an intervention.[4] ToCs are also dynamic and should be modified throughout the evaluation to reflect any diversions during implementation from the original theory. As such, it is recognised that the process of conceiving an intervention's ToC is an ongoing and iterative process, requiring regular review throughout the evaluation of the intervention. ToCs are typically developed in collaboration with stakeholders in order to build consensus on the change process. Their use has increased exponentially in the development sector[4]; a recent systematic review identified 62 studies employing ToCs to evaluate public health interventions.[10] However, there is comparatively little reflection on the process of using this method to design an evaluation.

This article describes the experience of using stakeholder workshops to construct an initial ToC that will go on to inform the evaluation of an intervention aiming to improve health worker payment and motivation in the Democratic Republic of Congo (DRC). It provides a range of lessons learnt from this process. A description of how the ToC is subsequently used and updated through a process evaluation will be the subject of a separate research article.

BACKGROUND

The DRC is a fragile and conflict-affected state with several health system challenges, including a dysfunctional public sector wage system.[11 12] Most health workers do not receive a salary,[11] which impacts on motivation, the staffing of facilities and therefore the delivery of healthcare. The poor remuneration of health workers stems from a government failure to update the payroll, a lack of sufficient resources and governance to address the problem and corruption, which has allowed the proliferation of unofficial appointments.

In 2013, the Department for International Development (DFID) started funding a 5-year health systems strengthening programme in DRC called ASSP (Accès aux Soins de Santé Primaires/ Access to Primary Healthcare), implemented through Interchurch Medical Assistance (IMA Worldhealth), which included an intervention to facilitate the payment of government salaries to health workers. This intervention involved: the establishment of an electronic open source Human Resources Information System (iHRIS) through a census of health workers and the definition of optimal staffing standards using the Workload Indicator of Staffing Need procedure, which together were aimed at ensuring sufficient workers were in place and that they were appropriately paid.

To date, similar interventions using iHRIS to record census data have been reported in other countries in the form of case studies.[13 14] In Sierra Leone, strong political will to improve governance was identified as a key condition for successfully ensuring the integrity of the health sector payroll.[14] However, these evaluations lacked a theoretical framework from the outset and focused on measuring outcomes rather than processes involved in implementing the intervention. Consequently, there is limited understanding of how to replicate such interventions effectively in different settings.[15–17] Given this, a ToC approach was employed to clarify how the intervention in the DRC would translate into its intended effects, thus informing the design of an evaluation of the intervention.

DEVELOPING THE TOC

A workshop was convened to develop the initial ToC with principal investigator RM as facilitator using guidance from previous training on constructing ToCs at the Wellcome Trust.[18] Stakeholders were identified through discussions with implementing partners and DFID. This workshop lasted 3.5 hours, with representation from IMA, DFID and Intrahealth as well as two staff conducting operational research on the programme.

During the workshop, RM described the ToC approach using examples and then asked stakeholders to undertake an exercise. The remainder of the workshop required stakeholders to collaboratively construct the ToC for the intervention of interest. Ground rules were established, requiring participants to: show respect for others' opinions, put aside personal agendas, be open-minded and agree to decisions made on the consensus view.

As human resources and health financing were two of the recognised building blocks of the health system being targeted by the intervention,[19] the ToC approach did not exclusively focus on the intervention but rather aimed to unpack the effects the intervention would have on the health system or the expected mechanisms of programme effect (how it works). On identifying the long-term goal of the intervention, stakeholders then worked back from this through to the earliest changes that needed to occur using the process of 'backwards mapping'. They were asked to populate coloured Post-it notes with different colours representing: the long-term outcome, preconditions or intermediate outcomes needed to achieve the final outcome, activities needed to move from one outcome to the next, assumptions (those conditions in which the intervention will take place which must hold true for the ToC to be realised), rationale for each link in the causal pathway and indicators (to evaluate

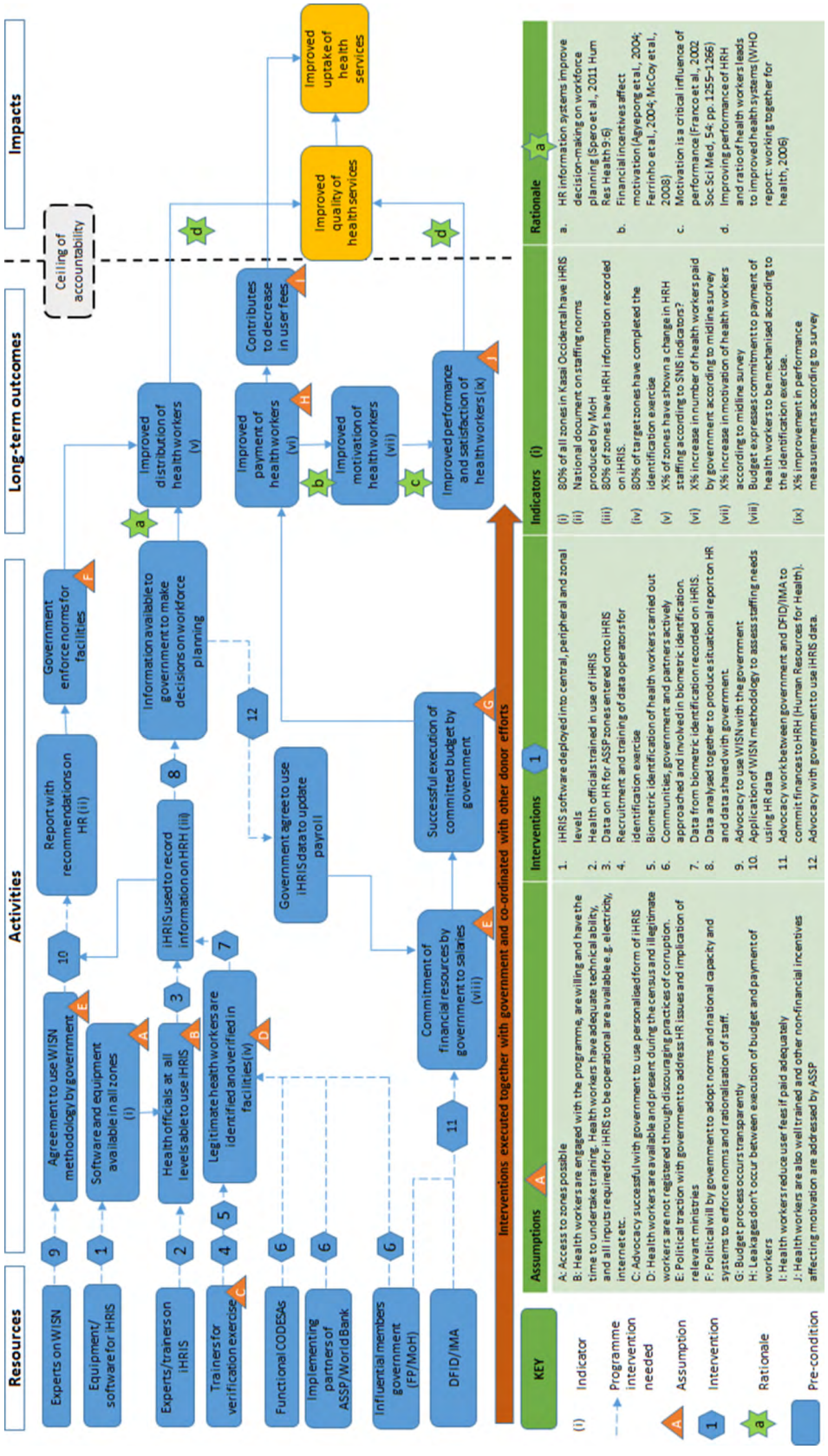

Figure 1 Initial theory of change for a complex intervention to improve the payment of government salaries to health workers in the DRC. ASSP, Accès aux Soins de Santé Primaires/Access to Primary Healthcare; CODESAs, Comité de Développement de l'aire de Santé/Community health committees; DRC, Democratic Republic of Congo; DFID, Department for International Development; FP, Fonction Publique/Ministry of Public Service; HR, Human Resources; iHRIS, Human Resources Information System; IMA, Interchurch Medical Assistance; MoH, Ministry of Health; WISN, Workload Indicator of Staffing Need.

whether the intermediate and final outcomes have been achieved). The facilitator then discussed the Post-it notes with the group and added those agreed on to a flip chart in order to map out the ToC.

Not all of the key stakeholders were present at this workshop; although Ministry of Health officials were invited, they did not attend. It also emerged during the workshop that government stakeholders from different ministries would need to be involved. Therefore, another meeting was organised that lasted 1 hour and included government representatives from the Ministries of Health, Public Service, Finance and Budget, as well as DFID, IMA and Intrahealth. All those present were asked to review a refined diagram of the ToC constructed on the back of the discussions from the first workshop.

Interviews were also held with individual stakeholders on the ToC both prior to and after implementation of the intervention, and each respondent was asked to review and comment on the final ToC. Interviewed stakeholders included those involved in the workshops, health workers who would be affected by the intervention, government officials at the provincial level and other donors in the health sector.

RESULTS

The resulting ToC is given in figure 1. As well as focusing on the implementation steps, the ToC describes the hypothesised mechanisms of change occurring within the health and wider public system. In addition to the two main programme activities, the ToC outlines the crucial input of government in endorsing staffing standards and using iHRIS and committing the necessary resources to funding salaries. The intervention is expected to improve the availability and distribution of health workers, increase their motivation to deliver quality care and reduce user fees (a key source of their revenue), making services more accessible to the population.

Reflections on the process and lessons learnt are described below.

REFLECTIONS

What worked well

In the first workshop, participants who were not well versed with ToCs found it particularly useful to be given a simple example of a ToC to help familiarise them with the terminology and understand the definitions and distinctions between assumptions and preconditions. The example provided related to an intervention to deliver measles vaccinations to children under 5 years of age, which had been devised by RM. This worked well because it was a relatively simple intervention that respondents were familiar with. While it may have been helpful to have guided participants through a more complex health systems strengthening example, which would have also emphasised the importance of applying systems thinking to the conception of the ToC, this had to be balanced against using a short and simple example that illustrated the concepts fundamental to developing a ToC.

Based on their roles in the intervention, stakeholders held very different views on what the long-term goal of the intervention should be. For example, DFID believed that the overall goal of paying health workers was to improve the quality of healthcare, while IMA thought it would remove incentives to charge patients high user fees. Through facilitation, the group conceded that both of these were expected outcomes of remunerating workers and aligned with the overall goal of increasing access to healthcare. Therefore, a positive outcome was that the ToC process brought respondents together to reach consensus on goals as well as widen their perspective on the different effects of the intervention. It also meant that stakeholders spent time unpacking the change process, reflecting on the connections between activities, outcomes and impacts, thereby revealing linkages that had previously been overlooked.

What did not work well

Failure to implicate all of the relevant government ministries with significant influence over civil service reform—namely the Ministries of Budget, Finance and Public Service—from the outset meant the intervention was initially viewed within the confines of the health sector; adopting this narrow perspective meant that the wider public institutional system within which this intervention was situated was being ignored. Ideally, a ToC would also be used to inform the design of an intervention, and the system that the intervention needs to change should be mapped first, in order to identify potential leverage points where the intervention can bring about change. In this case, however, the technical components of the intervention had already been agreed prior to the development of the ToC, so the ToC was used to guide the evaluation.

To enable sufficient government engagement, another meeting was held and integrated into the ASSP project's quarterly review meeting. However, a major limitation was that only 1 hour was allotted to the ToC in the agenda, during which the ToC developed during the first workshop was presented. Government stakeholders expressed little desire to comment or modify the ToC perhaps because they felt unable to challenge the existing theory that had been put forward. It is also plausible that the government did not fully understand ToCs as time was insufficient to go through a worked example. Another possibility is that the ToC was perceived to be more donor driven and/or did not reflect the reality of the DRC. Consequently, the government may have felt less ownership of the process but were also unwilling to go into any depth on the specific activities that they needed to lead on to enable success, such as how they would use the information yielded by the census to improve the payroll. Overall, this resulted in poor contribution of the relevant ministries to the conception of the ToC.

To mitigate this, two sets of follow-up interviews with key individuals were later held on the ToC for the intervention.

In the first workshop, implementing partners were reluctant to define indicators to monitor the intervention, as they felt failure to achieve targets associated with the indicators would be an indictment of their performance. However, they became more receptive once DFID acknowledged that the success of the intervention did not solely depend on their performance, as articulated by some of the assumptions. The idea that everyone has a role with no one group being responsible overall could have been better communicated by the facilitator at the beginning.

The opportunity to identify which stakeholders were responsible for progressing various elements of the ToC was missed when developing the ToC; making this more explicit would have had the advantage of clarifying responsibilities and strengthening accountability. However, this had to be traded against stakeholders perceiving the ToC as a way of controlling and monitoring their actions, rather than a tool to help test the hypotheses and assumptions of the intervention.

The expertise required to implement some of the technical activities for the intervention was to come from abroad. Therefore, at the outset, there were questions around the adequacy of the intervention design and applicability of the intervention to the DRC context. In addition, some of the articulated activities were very vague, for example, those that required 'advocacy with government'. Yet, the ToC helped to make these areas of uncertainty more explicit, thereby providing a focus for further work. Given the composition and interests of stakeholders involved in constructing the ToC during the first workshop, there was a degree of optimism bias that the intervention would be successful. This sometimes made it challenging to identify any potential negative or unintended consequences of the intervention. Power dynamics were also evident between stakeholders and possibly attributable to their differing incentives. For example, as implementing partners are reliant on donors for funding, this may have influenced their ability to maintain an independent perspective and position. Similarly, the Ministry of Health may have felt inhibited to speak out in the presence of the more powerful ministries involved in pay reform.

There was a lack of local engagement in both of the workshops; the views of health workers who would be the ultimate beneficiaries of the intervention were not elicited. This had the drawback of not giving them a voice or considering their needs; as a result, follow-up interviews on the ToC included health workers in the sample.

During follow-up interviews, a proposed modification to the intervention to improve its chance of success included working with other donors on the DRC's retirement policy. However, implementing partners and DFID were reluctant to consider this, perceiving it to be 'scope creep' that would also require far more resources.

LESSONS LEARNT

- *A systems thinking approach may require looking beyond individual sectors.* In this case, the process of developing the ToC was valuable in enabling consensus on the effects the intervention would have on the health system but should have given more consideration to the wider institutional system at the outset. Systems mapping is a tool that can be used in conjunction with ToCs to reach a deeper understanding of the system and help identify potential leverage points.
- *Identify all key stakeholders from the outset.* Stakeholders are identified as those with an interest in the intervention, are affected by the intervention or those who may have an active or passive influence over decision-making and implementation processes.[20] It is necessary to be as inclusive as possible at the beginning, recognising the importance of a range of perspectives in understanding the theoretical basis for the intervention.[21]
- *Invest time in ensuring a similar level of understanding of ToCs among stakeholders.* Often, stakeholders will not have heard of ToCs or have different ideas of what a ToC is,[22] therefore starting the workshop with a presentation on ToCs and some illustrative examples can ensure everyone has a similar level of understanding at the start. This will also ensure everyone feels confident enough to contribute to the development of the ToC.
- *Prepare to manage stakeholder dynamics.* In this case, unequal aid relations existing between donors and implementing partners, as well as between ministries may have affected the ToC discourse. Hence, having an independent facilitator can help ensure a degree of objectivity and mitigate any power imbalances. Other approaches may include limiting the participants in the workshop and stratifying groups to ensure open and honest contributions.[23] However, a multistakeholder workshop has the advantage of ensuring the sharing of different perspectives, clarifying roles and responsibilities, and lays the basis for collaboration.[24]
- *Avoid presenting a ready-made ToC.* Give space to all stakeholders to develop the intervention theory themselves. Although more time-intensive, particularly for those not familiar with the intervention, it is important in overcoming the phenomenon of 'group think', which can occur with those involved in conceiving the intervention. It will also ensure greater ownership of the end product by those with any influence over implementation.

CONCLUSION

The ToC process had utility in bringing respondents together to reach consensus on the mechanisms of effects of the intervention and its desired outcomes. It also demonstrated the importance of applying a systems thinking approach that helped in identifying and engaging all stakeholders who could influence the

success of the intervention. The role of the facilitator was key to: ensuring stakeholders have a clear understanding of ToCs, mitigating any power imbalances and encouraging a critical, honest and reflective approach.

Nonetheless, particularly with politically sensitive interventions like this, the process was not straightforward. It is hoped that the insights here shed light on what to do and what not to do and will encourage others to share their experiences to guide those using ToCs in their research.

Acknowledgements We would like to acknowledge the contribution of Tulane International (TILLC) in the DRC and IMA who assisted in the organisation of the workshops and also all those who participated in the workshops and interviews.

Contributors RM facilitated the workshops and drafted the initial manuscript. SM-J and JB helped to write the manuscript. All authors read and approved the final manuscript.

Funding The workshops were funded by the UK Government's Department for International Development as part of the ASSP Project.

Competing interests None declared.

Patient consent Obtained.

Ethics approval The process evaluation received human subjects review and approval from the Tulane University Institutional Review Board (reference number: 14-633280), the Kinshasa School of Public Health Ethics Committee (reference number: ESP/CE/024/2014) and the London School of Hygiene & Tropical Medicine Research Ethics Committee (Reference number: 8475). Informed written consent was obtained from all those participating in the study.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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How to and how not to develop a theory of change to evaluate a complex intervention: reflections on an experience in the Democratic Republic of Congo

Rishma Maini, Sandra Mounier-Jack and Josephine Borghi

BMJ Glob Health 2018 3:
doi: 10.1136/bmjgh-2017-000617

7.3 Research paper 5

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SECTION E

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BMJ Global Health

Performance-based financing versus improving salary payments to workers: insights from the Democratic Republic of Congo

Rishma Maini, Sandra Mounier-Jack, Josephine Borghi

To cite: Maini R, Mounier-Jack S, Borghi J. Performance-based financing versus improving salary payments to workers: insights from the Democratic Republic of Congo. *BMJ Glob Health* 2018;**3**:e000958. doi:10.1136/bmjgh-2018-000958

Handling editor Seye Abimbola

Received 15 May 2018
Revised 25 July 2018
Accepted 27 July 2018

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INTRODUCTION

Performance-based financing (PBF) is a type of provider payment mechanism where a financial incentive is given to healthcare workers that is linked to performance.[1] Also known as pay-for-performance (P4P), its use in low-income and middle-income countries has grown since 2005 when Rwanda adopted it as national policy.[1] Well-designed PBF schemes can be accompanied by broader reforms, which aim to clarify roles and responsibilities, strengthen accountability and address certain structural problems facing health systems.[1] However, a recent paper by Paul *et al* has raised concerns over the potential system-wide and long-term effects of PBF, which may be damaging to health services in low-income and middle-income countries.[2] This has led to a public debate on the evidence both for and against PBF in different settings,[3 4] and the authors would like to contribute to this by sharing an experience from the Democratic Republic of Congo (DRC).

Summary box

- Performance-based financing (PBF) has been extensively employed by donors in low-income and middle-income countries as a strategy to improve health service delivery.
- In the Democratic Republic of Congo, PBF is being implemented by donors and is endorsed by the Ministry of Health in a context where only a minority of health workers receive a government salary.
- A donor-funded health systems strengthening programme, which did not employ PBF, has recently succeeded in facilitating the payment of health workers by government.
- The programme achieved this by working closely with the government to conduct a census of health workers in order to update the payroll, which would in turn increase the number of salaried health workers.
- Key lessons learnt from this experience included the importance of understanding the existing financial architecture of health workers and its underlying constraints, and focusing on sustainable, national solutions rather than *stand-alone* donor-driven quick fix solutions, which may be more challenging to maintain over the longer term.

THE DRC CONTEXT

Although the DRC has been post-conflict since 2003, its health system remains weak; hospitals and clinics lack personnel and equipment, and often run out of critical medicine and supplies. Few public sector health workers receive any government payments; this is due to the payroll being out of date and plagued by 'ghost workers', which are people listed on the payroll to receive a salary but who do not currently practice in health facilities.[5] Therefore, in an effort to maintain health service delivery, donors have been implementing PBF schemes across the country for several years. Many of these have been delivered as stand-alone PBF programmes; for example, a previous health programme called Access to Healthcare (ATH) funded by the Department for International Development (DFID) between 2008 and 2013 channelled payments to workers outside of the national system. By 2015, a quarter of all health zones were receiving PBF support from various different donors.[6] Its roll-out has been endorsed by the Ministry of Health, but there is no national PBF scheme for the country as yet.

However, in the DRC, the evidence suggests that health workers do not value PBF payments as much as they do fixed salaries.[7 8] Effects of PBF on performance have also been mixed in this context. In one study, PBF led to efficiency gains and improvements in service quality[9]; another study demonstrated

that PBF did elicit an increase in efforts to target service provision, but did not stimulate demand for services, and even resulted in a reduction of intrinsic motivation of workers.[10]

AN ALTERNATIVE TO PBF

In 2013, a new health systems strengthening programme funded by DFID called Accès Aux Soins de Santé Primaire (Access to Primary Healthcare/ASSP) commenced. In contrast to other donor programmes that were continuing with PBF or introducing follow-on PBF schemes, ASSP started to phase PBF out from its predecessor programme ATH. It was hypothesised that the presence of PBF—among other reasons including a low national budget for health, poor governance and security issues—had reduced incentives for the government to salary its health workers, thus potentially undermining system-wide reform in the sector. Instead, the ASSP programme worked closely with the government to conduct a census of health workers in order to update the payroll, which would in turn increase the number of salaried health workers.[5]

In practice, the phasing out of PBF proved difficult: it was perceived to have caused an exodus of workers from facilities as well as to have negatively affected their motivation and relationships with the local community.[11] Part of the reason was that the change was poorly communicated, and performance payments were much higher than other sources of revenue received by workers including salaries, and so their removal constituted a significant economic shock to workers.[8 11] Nonetheless, those workers who remained in facilities post-withdrawal of PBF indicated they would prefer to receive a fixed salary payment from the government compared with a performance payment from donors, as they saw the former as a more sustainable source of income.[8]

ASSP eventually succeeded in updating the health worker payroll for the provinces of Kasai and Kasai Central, as described by Likofata *et al*.[5] Ghost worker payments were redistributed to thousands of previously undercompensated or uncompensated health workers in the civil service. However, the solution was not solely technical. The payment of health workers was outside the control of the Ministry of health, and under the purview of the Ministries of Finance, Budget and Public Sector Reform. Development partners involved in implementing ASSP therefore had to build relationships and work across these different Ministries, in order to secure government ownership and influence change. This was particularly crucial as there would have been vested interests within Ministries to maintain the status quo as salaries tend to be intricately tied to patronage and issues of political expediency.[12] The DRC's Health Development Plan 2016–2020 also now acknowledges there is a continued need to strengthen information systems on human resources for health and improve on the number of salaried workers.[13]

LESSONS LEARNT

Several key lessons were learnt from this experience. First, PBF can serve as a distraction from the pursuit of more challenging interventions that are needed to address the underlying constraints of health systems. In the DRC, the financial compensation received by workers under donor-funded PBF schemes was effectively serving as a partial substitute for salaries, as only a minority of workers were being paid by the government; a similar analogy would be that of applying a plaster to an infected wound, rather than treating the underlying infection. The attraction of PBF for donors is understandable as it allows them to measure and demonstrate to their own governments and tax payers the results and value for money of their investments. On the other hand, interventions that require donors normally focused on health to work across several Ministries may seem less appealing.

Yet, a failure to address the problems at root can lead to a perpetuation of weak government leadership and accountability.[14] In fragile and conflict-affected states such as the DRC, despite close coordination with government, PBF schemes are often still too complex for states to manage within their existing systems, and so involve the introduction of parallel systems to channel funding to providers and verify performance. Due to poor governance and accountability in the DRC, partners do not provide budget support; instead, PBF funds go directly into the accounts of health facilities. This results in PBF undermining rather than reinforcing state capacity.[15] Furthermore, given that donor funding for performance-based incentives will in all likelihood eventually be withdrawn, there is the risk of creating a dependency on an income source that is not sustainable over the long term, with all the negative consequences that can entail.

Another lesson learnt was the need to understand the financial environment within which health workers operate when considering PBF initiatives.[16] It has been acknowledged that PBF initiatives are often implemented as stand-alone projects without due consideration being given to the overall health system environment and their integration therein.[17] Although the PBF model employed by the ATH programme did show evidence of improvements in performance over the short term,[10] it could not have been sustainably financed in the absence of external aid. Soucat *et al* have highlighted the importance of understanding how PBF could be blended with the existing base payment mechanism to effectively align provider incentives with health policy objectives.[17] This is key to ensuring that the system is structurally and financially sustainable; rather than adding extra income through a parallel system, existing income payments may be adjusted to make a proportion of it performance based. More recent innovations, like the Global Financing Facility which has started in the DRC, may also provide a good mechanism to support government efforts to enhance domestic resource mobilisation.[18] The authors would argue, however, that the payment of

salaries to workers should first be ensured before introducing more complex remuneration structures.

CONCLUSION

Donor-funded work to support the financing of health systems and its health workers should as far as possible address local priorities, be integrated into existing systems and seek to address root cause challenges, rather than focus on quick fix solutions such as stand-alone PBF schemes, which may be harder to sustain over time and could also lead to unintended consequences. This may require a commitment to working across Ministries and a willingness to prioritise sustainable national solutions over donor needs to quickly demonstrate results of aid.

Contributors RM drafted the initial manuscript. JB and SM-J reviewed and helped finalise the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests The lead author has recently been appointed as a health adviser for the Department for International Development (DFID). DFID funded the health systems strengthening programme referred to in the commentary.

Patient consent Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement This is not an original research article and thus no data are available.

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7.4 Research paper 6

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Primary Supervisor	Josephine Borghi		

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Stage of publication	**Submitted**

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For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Conceived the study, and designed it in collaboration with JB and DRH. Designed, analysed and interpreted the quantitative and qualitative data. Drafted the initial manuscript, and all authors helped to revise it critically for intellectual content.

SECTION E

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A process evaluation of a complex health systems intervention to improve the payment and distribution of health workers: the need for an adaptive programming and evaluation approach

Rishma Maini,[a*] Sandra Mounier-Jack,[b] David R Hotchkiss,[c] and Josephine Borghi[d]

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Key words: Implementation fidelity, process evaluation, theory of change, Democratic Republic of Congo, health worker payment.

Contributions to the literature

- Little evidence exists on how poorly functioning public sector wage systems can be strengthened in post conflict states.
- This study employed a theory-based approach to evaluating an intervention to improve government payments to workers in the Democratic Republic of Congo. Securing engagement from influential actors early on, using financial data to advocate for policy change, and banking reforms ensuring greater transparency around pay were important steps in achieving the intervention's overall objectives.
- These findings have important implications for future work on pay reform in fragile and post-conflict states.

Abstract

Background:

Complex health systems strengthening interventions consist of multiple independent and interacting components which directly target one or more of the six health system building blocks. An ambitious intervention implemented in 2014 in the Democratic Republic of Congo to improve government payment and distribution of workers can be described as such an intervention. Key objectives of the intervention were to: update the payroll to improve the remuneration of workers by government as well as revise staffing standards based on service needs to ensure workers were more efficiently distributed in facilities. This paper investigates the implementation process, exploring the degree to which the planned intervention was adhered to, and any contextual factors which may have moderated implementation.

Methods: The evaluation occurred between October 2014 and March 2018, and examined implementation fidelity or the extent to which the intervention was implemented as planned in terms of coverage, execution and duration. A theory of change was also developed which identified implementation steps required for the intervention, informed data collection, and helped to monitor progress. Data were collected through document reviews and in-depth interviews with key informants throughout the intervention.

Results: Despite the challenges associated with working in a fragile state, full coverage of the intervention was achieved. Most of the component interventions described in the initial theory of change were carried out as intended although some adaptations had to be made. Specific to this intervention, securing the engagement from influential actors early on, using financial data to advocate for policy change, and banking reforms ensuring greater transparency around pay facilitated the achievement of key objectives of the intervention.

Conclusions: Complex health systems strengthening interventions may necessitate an adaptive approach to both implementation and evaluation given the dynamic nature of the system within which they occur.

BACKGROUND

The Democratic Republic of Congo (DRC) is a fragile and conflict-affected state, whose government struggles to pay its public sector health providers for reasons including: coordination problems amongst Ministries responsible for payroll reform; resistance from those benefiting from misdirected public resources; and a lack of a robust information system on public sector workers. The government payroll is also known to be plagued by "ghost" or fictitious workers, which are people listed on the payroll to receive a salary but who are not currently practicing (Bertone et al., 2016, Fox et al., 2013).

The inadequate remuneration of health workers significantly influences their motivation and performance, affecting the quality of health care provided and can lead workers to seek other income sources, such as: user fees, illicit fees, and private practice (Maini et al., 2017). It also leads to an inefficient distribution of workers with shortages of health professionals in areas where income-earning opportunities are low, but oversupply in other areas (Hongoro and Normand, 2006). Finding ways to adequately pay and incentivise health workers is therefore an issue of global concern and has led to a recent proliferation of initiatives and studies in this area (Witter et al., 2012, Ogundeji et al., 2016).

Complex health systems strengthening interventions typically consist of multiple independent and interacting components (Craig and Petticrew, 2013) targeting one or more of the six health system building blocks defined by the World Health Organization (Janovsky et al., 2006). Despite this complexity, previous interventions to reform the pay and distribution of health workers have not been rigorously evaluated but rather reported as case studies, with a predominant focus on outcomes (Goldsmith, 2011, Simson, 2013, Dieleman et al., 2009). This "black box" approach fails to explain how and why an intervention had certain effects (Stame, 2004, Pawson et al., 2005, Bonell et al., 2012). Process evaluations, on the other hand, can identify causal mechanisms through which interventions may influence an outcome. Understanding to what extent interventions were implemented as intended, as well as identifying contextual moderators, is fundamental to knowing what elements underpin success, informing replication elsewhere (Carroll et al., 2007, Adam et al., 2012, Oakley et al., 2006).

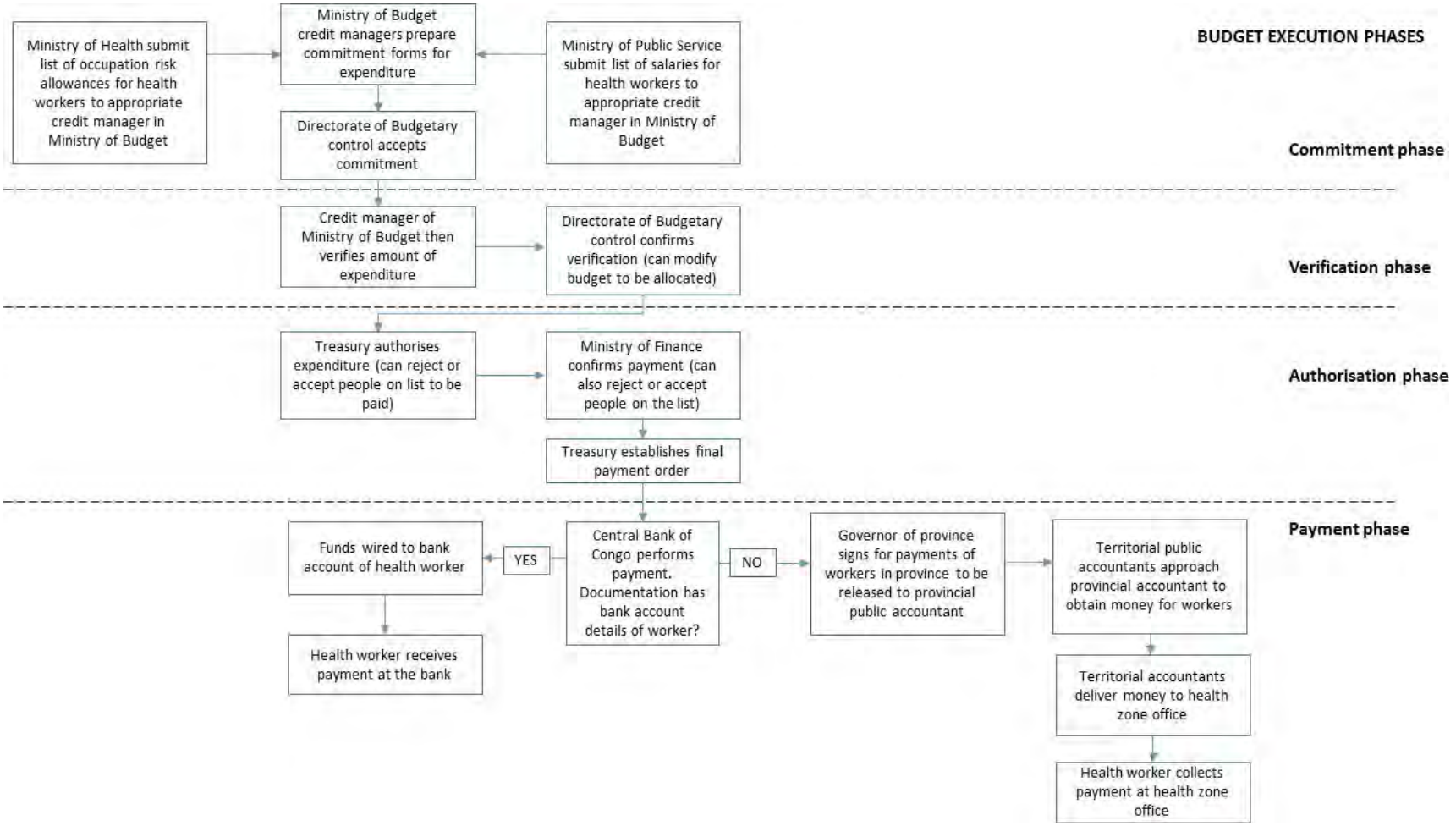
A recent paper described how the establishment of a human resources information system in the DRC enabled the reallocation of 3412 government payments (worth approximately US$150,000 per month) from ghost workers to legitimate workers (Likofata Esanga et al., 2017). However, that paper focussed on the technical elements of the system and failed to elaborate on the process that led towards the outcomes achieved.

The aim of this study is therefore to unpack the black box of this intervention in order to more fully understand the implementation process, contextual moderators, and how it may have led to the successful outcomes observed. It is hoped that the insights gained will help to inform similarly ambitious and complex interventions in the future.

Study setting

The effects of conflict have taken their toll on the DRC's health system and its workforce. In particular, there is a lack of transparency and sound financial management when it comes to the payment of health workers by government (Herderschee et al., 2012). Salaries for health workers were nominal following the economic crisis and conflicts during the 1990s, so in order to increase wages, occupational risk allowances or "primes de risque" were introduced (World Bank, 2008). These are paid to workers delivering clinical services who may be exposed to certain health risks (e.g. infectious diseases such as Ebola), and are managed by the Ministry of Health while salaries are controlled by the Ministry of Public Sector Reform (Figure 1). Different lists of workers are used by these Ministries meaning that the proportions of workers receiving each payment can be vastly different (Bertone et al., 2016, Maini et al., 2017). One study indicates that 31% of nurses in primary care receive a salary, while 54% receive an occupational risk allowance (Maini et al., 2017). This dysfunction creates confusion amongst health workers around what they are entitled to receive. Further, the vast majority of rural facilities lack the basic number of staff required by staffing norms, significantly impacting on the delivery of health care and health outcomes (World bank, 2015),whereas facilities in urban areas often employ a high number of personnel.

Figure 1: Role of the different Ministries in the execution of government payments to health workers



Description of the intervention

The United Kingdom's Department for International Development (DFID) has been funding a five-year health system strengthening programme called Accès Aux Soins de Santé Primaire (Access to Primary Health-care, or ASSP) since April 2013. This programme supports health centres and hospitals to deliver a basic package of services in 52 health zones[1] of the DRC in five provinces[2]: Kasai, Kasai Central, Nord Ubangi, Maniema, and Tshopo. The non-governmental organisation Interchurch Medical Assistance Worldhealth (IMA) is the lead implementing partner of a consortium of sub-contracted partners. One part of this programme involves IMA working with the sub-contracted partner IntraHealth to implement a complex intervention to improve the payment and distribution of health workers.

The intervention was to consist of two main components which are outlined below.

1. *Generation and utilisation of information to improve government payments to workers*

   The establishment of a database on legitimate government recruited health workers that are currently working. This was to be piloted in ASSP health zones within Kasai Central and Kasai provinces (formerly known together as Kasai Occidental). Information on health workers recorded in the database would include: qualifications, place of work, and whether they were receiving a salary and/or occupational risk allowance. Biometric data to uniquely identify workers would be recorded in the form of finger-prints and photographs.

2. *Updated staffing norms*

   Using updated information on health service needs to revise the national guidelines on staffing standards from 2006 (Ministère de la Santé, 2006) to enable more efficient and equitable staffing of facilities.

Central to both components was the need to encourage government to use the information generated to improve payments to health workers and enforce the revised national staffing standards.

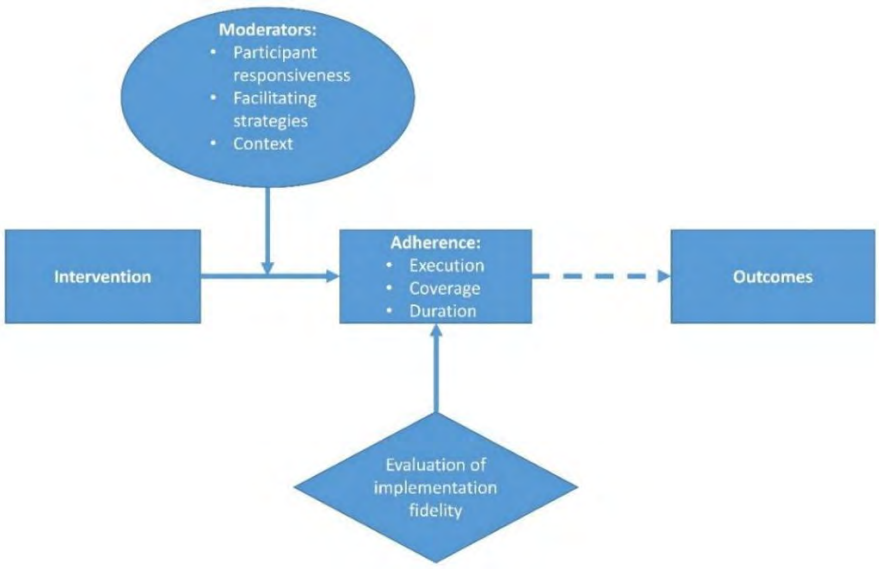
[1] A health zone is a defined geographical area with a population between 100,000 and 150,000 people and is usually served by one reference hospital. DRC is thought to have 516 health zones in total.
[2] Prior to July 2016 and decoupage, the provinces were: Kasai Occidental, Equateur, Maniema and Province Orientale.

METHODS

Implementation fidelity was examined using a conceptual framework adapted from Carroll et al.(2007), to identify the extent to which the intervention had been implemented as planned (implementation adherence) by measuring its coverage, execution and duration (Figure 2). **Coverage** examined whether all those originally targeted by the intervention received it; the information on government payments to workers was to be collected on workers in 28 health zones covered by the ASSP programme in the Kasai provinces, while data to update the staffing norms would be derived from a representative sample of facilities across the country. **Execution** measured whether the activities were implemented as intended. The expected **duration** of the intervention was June 2014 until December 2014.

Potential moderators of implementation of the intervention also identified by Carroll et al. (2007), were examined, including: **participant responsiveness**, which measures to what extent participants respond to, or are engaged by, an intervention; **facilitating strategies**, which are measures put in place to optimise the level of fidelity achieved, and; **contextual factors** external to the intervention which may have acted as either barriers or facilitators to implementation. In addition, the evaluation explored potential unintended consequences, such as whether the intervention affected the progress of similar interventions occurring in other sectors.

Figure 2: Conceptual framework to examine implementation fidelity (Carroll et al).



Theory of change

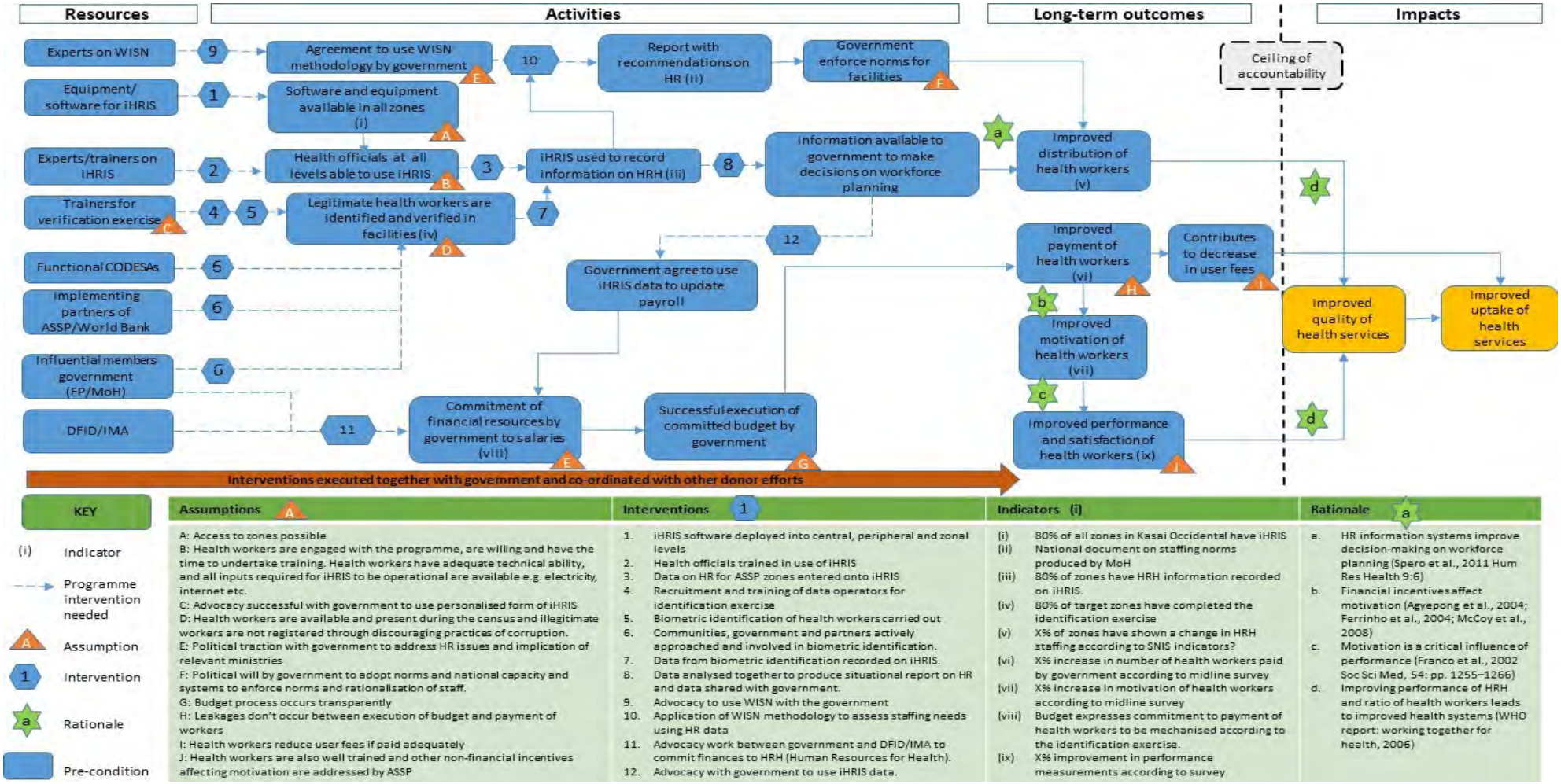
In measuring implementation adherence, specifically execution of the intervention, a Theory of Change (ToC) was constructed outlining implementation steps and hypothesised mechanisms of change. The ToC was developed during two workshops held by RM in October and November 2014, and attended by representatives from: IMA WorldHealth, DFID, Intrahealth, and officials from the DRC Ministries of Health, Public Service, Finance and Budget. Reflections on the process of developing this ToC are described in another paper (Maini et al., 2018). The resulting ToC is shown in Figure 3. Component 1 would involve conducting a biometric census (including fingerprint identification) of all active health workers in Kasai Central and Kasai provinces covered by the ASSP programme. Once the information was independently verified by members of the community as well as provincial and national government, it would be recorded on electronic software called iHRIS (open-source Human Resources Information System) (World Health Organization, 2012). Improvements in information on health workers would then be used to clean the payroll and better allocate government payments, which would in turn increase the motivation and performance of workers.

For component 2, a process called WISN (Workload Indicators of Staffing Need) (World Health Organization, 2014) would determine the optimum number of workers needed to staff facilities. The steps involved in this method, which is essentially a human resources management tool, have been described in detail elsewhere (McQuide et al., 2013, Govule et al., 2015). Essentially, data are collected from a sample of health workers on the activities they undertake and the time taken to do these, in order to define workload components and establish activity standards for cadres. Analysis of these data using the WISN method yields information on the workload pressures of different cadres of staff in different facilities, which can then be used to inform the development of national standards for staffing at facilities. If enforced, these standards would lead to a more efficient distribution of workers between facilities.

Both intervention components were hypothesised to contribute to improved quality and uptake of health services. Political will of the government to address these issues was

recognised as a critical assumption which would fundamentally influence the success of the overall intervention. Some of the activities in the ToC were very broadly described, e.g. advocacy with government, to afford implementing partners a degree of flexibility as to how to best adapt the intervention as it progressed.

Figure 3: Theory of Change for the human resources intervention



Legend: CODESA: Local health committee; FP: Ministry of Public Service; MoH: Ministry of Health; DFID: Department for International Development; IMA: Interchurch Medical Assistance; iHRIS: open source Human Resource Information System; HRH: Human Resources for Health; ASSP: Access to healthcare programme; WISN: Workload Indicators of Staffing Norms; SNIS: National Routine Health Information System

Key informant interviews

We conducted three rounds of semi-structured interviews; one round with 17 stakeholders (January to February 2015, which was before implementation of the census and the WISN process); a second round with 24 stakeholders (April to May 2016) with the higher numbers in this round compared to the first occurring due to snowball sampling; and a third round of more focussed interviews with four stakeholders (March 2018). The first two rounds occurred during implementation of the intervention while the last was conducted once most activities had been completed. This sequencing allowed the researchers to record implementation fidelity, as well as the influence of moderating factors such as participant responsiveness and context. Each round of interviews also inquired about any wider unintended consequences of the intervention; for example, a previous civil service census exercise had provided more opportunities for corruption (Bomboko et al., 2007).

Interview participants included those involved in the initial ToC workshop and others either involved in, able to influence, or benefit from the intervention (Table 1). An experienced local qualitative researcher familiar with the cultural context and RM conducted all interviews in either French or English depending on the preference of the interviewee. None of the interviewees declined to participate and interviews were undertaken in a private room to maintain confidentiality and audio-recorded subject to consent. Interviews varied between 45 minutes to one and half hours, and audio recordings were transcribed in French or English by the local researcher and primary author respectively (the researcher's respective first languages) to maximise accuracy. The primary author then reviewed all transcripts and managed the data using NVivo 10 software. Qualitative data were analysed using the adapted framework by Carroll et al. (Figure 2) as the main deductive framework with which to code responses. The ToC provided the basis to assess whether planned activities were executed as intended, and whether any consequences of the intervention had been anticipated or not. Interviews were coded iteratively at each round so that themes emerging in early interviews could also be explored in later ones.

Table 1: Stakeholders interviewed and rationale for their selection during rounds of qualitative data collection

Organisation/ Location	Number of respondents per organisation	Rationale for interviewing
Intrahealth	2	Non-governmental organisation responsible for implementing the technical aspects of the intervention.
IMA Worldhealth	3	Lead implementing partner of ASSP
DFID	2	Funding the ASSP programme
World Bank	1	Previous involvement in civil servant censuses, and in implementing governance strengthening programmes in the DRC.
Japanese International Cooperation Agency	2	Involved in programmes to strengthen Human Resources for Health in the DRC.
DRC Ministry of Health (central and provincial levels)	3	In charge of administrative management of health personnel and the list of workers receiving occupational risk allowance payments.
DRC Ministry of Public Sector Reform (central and provincial levels)	3	Charged with recruitment and management of civil servants, including the list of workers to receive payment of salaries.
DRC Ministry of Budget (central and provincial levels)	3	In charge of validating any payroll expenditure (both salaries and occupational risk allowances).
DRC Ministry of Finance (central and provincial levels)	3	Ministry responsible for releasing the payment order (for salaries and occupational risk allowances).
Health zone workers	2	Beneficiaries of the intervention.

Document review

Information on the execution, coverage, and duration of intervention activities obtained from project documents was reviewed to profile implementation fidelity. Reports included: ASSP quarterly progress reports to DFID, Intrahealth reports and presentations, and meeting minutes.

RESULTS

The results below summarise the extent of adherence to the intervention in terms of execution, coverage, and duration. They also describe: participant responsiveness to the intervention; facilitating strategies employed; the role of context in affecting implementation; and any unintended consequences.

Implementation Fidelity

Execution:

For both components of the intervention, a number of planned programme activities were executed as intended and in accordance with the ToC (see additional file 1). The only activities which did not take place as planned were the fingerprinting of health workers during the census, and the production of a situational report on human resources for government.

It was also recognised that certain activities, such as the recording of data into the iHRIS system, should not just be conducted as a one-off. The intervention would need to adapt to ensure the data were updated frequently to include new staff recruited to facilities or changes in details of staff over time.

Duration:

The entire intervention started in June 2014 as planned and was expected to be completed by December 2014, however, significant delays were experienced in relation to implementation. For example, the census was not carried out until over one year after it had initially been scheduled. The development of staffing norms also took much longer than anticipated. By March 2018, most activities were completed but some were still ongoing (see additional file 1). Reasons behind the delays are further explained under moderating factors.

Coverage

The WISN analysis to inform the development of national staffing standards was conducted as planned on data from a representative sample of health facilities from Kinshasa and four provinces. Therefore, the intended coverage for this component of the intervention was achieved. However, in relation to the census, there was a deviation from the original plans. Formerly, it was planned that the census of workers would only be undertaken in zones covered by the ASSP programme, which was 28 zones in total. However, the provincial Ministry of Health requested that the census be undertaken in all 44 health zones of the Kasai and Kasai central provinces to ensure complete rather than piece-meal coverage of both provinces. Therefore, actual coverage of this component exceeding planned coverage for political reasons.

Moderating factors

Participant responsiveness:

When the intervention was first conceived, engagement of government stakeholders had mainly been confined to the Ministry of Health. However, it quickly became clear to development partners that other Ministries are involved in health sector pay: the Ministry of Public Service is responsible for maintaining the register of civil servants and controls the information on workers to receive a salary, the Ministry of Budget is charged with preparing and monitoring the national budget, and the Ministry of Finance releases spend. It was admitted by international health partners that the delay in engaging with these other Ministries occurred in part because they did not have any experience in working with them. There was also a widespread perception that the intervention, particularly the census and subsequent cleaning of the payroll, would likely be met with resistance from these other Ministries, as a more transparent payroll would minimise any opportunities for corruption.

> As you know, not all people want it to change, there are people who are in the mafia today, …who would not want a situation of transparency, because they play with other people's salaries. So, if there is a transparent situation that means every person who works is known and if there is the money that is paid into the bank account of this person, the mafia can no longer survive.

Non-government, 1st round interviews

Once eventually consulted, the Ministry of Public Service questioned the legitimacy of international health partners to undertake a census of health workers, indicating that the intervention was not adequately aligned with national public administrative reform strategies. In particular, this Ministry was concerned that the approach could lead to a proliferation of multiple sector-specific information systems which were incompatible with their own overarching system to manage the civil service payroll.

> The idea is to have one system that manages both the human resources and the payroll of the public servants…to further reduce the multiplicity of databases and systems…a sector cannot claim to carry out a series of activities without receiving a mandate from the Ministry of Public Service which is the guarantor of the activity.

Government, 2nd round interviews

The implementing partners further realised the importance of having the Ministry of Public Service engaged in the census, as this Ministry had the exclusive right to undertake finger-printing of all civil servants in order to prevent double registration. However, significant delays ensued in starting data collection for the census as the Ministry of Public Service would not authorise the use of finger-printing until an independent cabinet was established to oversee the process. The argument that Intrahealth could be viewed as being impartial was not accepted by the Ministry of Public Service. After several months of unsuccessful negotiations, the implementing partners decided to forge ahead without finger-printing, as information on the number and location health workers would still be useful to inform decision-making for workforce planning.

By mid-2016, the results of the census were presented by implementing partners to the Ministries of Budget, Finance, Health and Public Service Reform. The findings indicated that there were over 2000 ghost workers (Likofata Esanga et al., 2017). The Ministry of Budget committed to setting up a payroll review committee tasked with re-diverting payments from ghost workers to legitimate workers.

> With that very public information, that there are 2000 ghost workers…I think they (the government) would risk their reputation and perhaps their jobs if they do nothing.

Non-government, 3rd round interviews

Unlike the census, the decision to update staffing norms was under the complete control of the Ministry of Health. The Ministry was invested in the idea of having a more efficient workforce, and so responsiveness to this aspect of the intervention was high. It was also acknowledged by the Ministry of Health that the current workforce lacked in

certain key personnel such as pharmacists, but that there was also a glut in other cadres such as doctors.

> The problem is that we are recruiting categories (of workers) that are overcrowded, for example the general doctors, there are too many now but we continue to recruit them…

Government, 1st round interviews

Facilitating strategies

In the delays running up to the census and in recognition of the political sensitivities related to reforming the payroll, DFID commissioned a political economy analysis. The purpose of this was to examine communication lines and relationships between Ministries, how incentive structures aligned and differed, and any other potential interventions which could positively influence reform of health worker pay. This analysis was helpful in explaining some of the existing power struggles between Ministries which had contributed to the significant delays incurred during implementation. For example, although the Ministry of Public Service was in charge of recruitment and of granting employee registration, most Ministries including the Ministry of Health had started to deal directly with the payroll department in the Ministry of Budget which seemed to have become the key decider over who was included in the payroll. Implementing partners identified that their political capital would be better invested in influencing the Ministry of Budget to pay legitimate workers their occupational risk allowance which was managed by the Ministry of Health, rather than to help improve the payment of salaries given the resistance faced from the Ministry of Public Service. To progress negotiations and advocacy with Ministries, DFID's health team also enlisted the help of its governance team with its contacts and networks to assist in many of the political discussions.

> The Ministry of Health has direct control over "primes" (occupational risk allowances), payment occurs more frequently, and doesn't require the same process for salaries…there is potential for greater traction.

Non-government, 2nd round interviews

For the WISN component, the delays experienced were mainly because the process required some of the data collected from the census, such as the number and cadres of health workers. However, implementing partners admitted that they had also underestimated other data requirements as well as the complexity of data analysis using the WISN method. WISN uses annual service statistics to assess workloads but most of the health facilities in the DRC do not keep good records. This led the implementing partners to request additional capacity and resources, as well as the enlistment of international expertise, in order to facilitate progress on WISN data collection and analysis.

Role of context at the macro-level

A major national policy change which supported the intervention was the extension of 'bancarisation' from the payment of salaries to also include occupational risk allowances in October 2015. Bancarisation refers to the establishment of bank accounts to pay employees. Occupational risk allowances were previously paid directly to workers in cash. Extending bancarisation to the occupational risk allowance helped to elevate the profile of the issue of ghost workers, as far more workers received these allowances compared to a salary. With the introduction of bancarisation, payments to non-existent workers would start to accumulate at the bank, and after a period of time, these unclaimed funds would be returned to the central bank but not the Ministry of Health. This meant the government stood to lose significant amounts of money to the bank, thus offering them a clear incentive to clean the payroll.

> One of the reasons the decision (to clean the payroll) was made was because of bancarisation…Money you can't access, you cannot use. Therefore, it needs to be changed so that the funds can be used.

Non-government, 3rd round interviews

Some interviewees had expected the DRC environment would pose a barrier to accessing health zones in order to deploy training and undertake the census.

> Our country being vast, there are difficulties in terms of geographical accessibility. There are places where there are no roads, sometimes you have to cross a river, you have to take the canoe, and if the person is not used to doing it, it means it can be really dangerous.

Non-government, 1st round interviews

Despite the poor road infrastructure in remote areas and lack of internet connectivity, full coverage of the census and training in iHRIS was achieved as local staff were accustomed to overcoming difficulties of the terrain. Technical solutions such as VSAT (Very Small Aperture Terminals)[3] were employed to enable internet access at health zone offices.

Unintended consequences

An unintended but positive consequence of the intervention was the reaction of the donor community to the work undertaken to improve the government payroll. With the exception of the World Bank, donors had historically shied away from programmes tackling the underlying causes of poor health worker remuneration. Instead, most tended to invest in performance-based financing schemes where funds were channelled to workers outside the government system. Reasons given included: a lack of clear entry points to reform the payroll, pressure to demonstrate quantifiable impacts on service delivery within short time-scales, inability to directly fund the wage bill due to weak public financial management systems, and difficulty in securing funding for high-risk system strengthening interventions. However, on presenting the results of progress made on the intervention at the joint donor health group and related thematic groups, there were signs of a gradual coalition of support to similar interventions to improve government payments to workers (including in other sectors) in the future.

[3] VSATs are devices that are designed to facilitate effective telecommunications and Internet connectivity in remote places

> One of the major barriers to progress in this area is not that people don't think it's important, it's just people don't have a sense of practically how we can take on the issues of human resource management in a constructive way…I think we're just beginning to make some headway and there's the early momentum towards this area that hopefully also attracts more attention.

Non-government, 2nd round interviews

Another positive consequence was that the intervention shifted health workers' perceptions around their remuneration. Increasingly, workers began to expect government to start paying them, rather than rely on donors to fill the gap.

> …in the previous programme, one of the outcomes of that was that there was quite a strong sense that the management of the health care workers and their remuneration was something that health workers turned to the programmes to provide. By the later stages… they were turning to the Ministry of Health and the government in the DRC, to say, look, we deserve to be paid, we need to be paid, what are you going to do about ensuring health workers receive the salaries that are due?

Non-government, 3rd round interviews

Discussion

Despite the challenges of implementing an intervention of this nature in a fragile state, full coverage was achieved, with one component (the census) even exceeding the intended coverage. On the other hand, the duration of the intervention took much longer than originally anticipated; this required adaptation of the evaluation as well as the intervention.

Most of the activities described in the initial ToC were carried out according to the design, although some were not executed, for example the finger-printing of workers. This was due to a failure to engage the appropriate Ministries involved in health worker pay from the start; public sector pay goes beyond a specific sector and tends to be defined for all government services rather than specifically for health. A reflection on the reason why this happened was that health donors tend to liaise uniquely with the Ministry of Health, and may find it challenging to work with other Ministries where they have no established contacts. This was also observed in Chad, where despite

positive results from a pilot PBF scheme, PBF failed to be institutionalised in national policy as influential stakeholders beyond the Ministry of Health had not been sufficiently involved (Kiendrébéogo et al., 2017).

Our experience in the DRC showed that, once engaged, the Ministry of Budget was very responsive to the findings, partly because the financial savings of implementing change were communicated to them. Another important lesson, therefore, was the power of using financial data to make the case for policy change that impacts on health care, particularly to finance Ministries. Similarly, in Sierra Leone political traction was gained for a similar intervention through publicising savings from cleaning the payroll (Simson, 2013).

Hence, participant responsiveness had a strong influence on the implementation of the intervention. Berkel et al (2011) have shown that for public health prevention programmes, even if they are delivered as intended, limited participant responsiveness in terms of involvement and engagement in the programme will mean these programmes are unlikely to achieve their intended outcomes. Indeed, a large scale multi-donor project initiated in 2005 aiming to reform the payroll for several sectors in the DRC had previously been unsuccessful as civil servants had not felt involved enough in the process, viewing it as a donor-driven exercise (Moshonas, 2018).

Yet the response of participants was not always straightforward or easily predicted, as observed with the Ministry of Public Service in this intervention. In this regard, the political economy analysis undertaken by implementing partners proved to be a powerful tool in revealing insights into how power, resources and incentives were distributed between stakeholders.

Contextual factors also had some bearing on implementation of the intervention. In particular, the recent reforms on bancarisation were timely and provided a strong motivator to government to clean the payroll as they would have continued to lose money to the central bank in the absence of any action. Unexpectedly, difficult terrain was not a barrier to implementation.

Finally, positive unintended consequences were identified. Even though implementing partners had not actively advocated for it, the successes observed through this intervention meant that other donors became more supportive and open to strengthening

the payroll. The intervention also raised awareness amongst health workers of the state's responsibility to pay them, as health workers understood why the census was being undertaken; this may in time lead to improved governance of the health system as information dissemination can have a positive impact on strengthening accountability. For example, in Uganda, a survey in 1995 indicated that district governments were not transferring 80% of budgeted resources to schools, and this was made public through newspapers and other media (Reinikka and Svensson, 2004). By 2001, the diversion of funds reduced to less than 20%.

Suitability of the evaluation approach and transferability of the findings

This evaluation indicated that inflexible intervention designs may not be a good match when addressing the dynamic properties of health systems (Paina and Peters, 2011). For example, had the design not allowed for changes in coverage of the census and duration of the overall intervention, none of the outcomes would have been successfully achieved. Alternatively, an adaptive programming approach may be more relevant to health systems strengthening interventions, particularly where evidence on cause and effect is weak (World Health Organization, 2006, Adam et al., 2012).

However, classical evaluation frameworks do not tend to address the issue of how to adapt an intervention while still maintaining its effectiveness. Carroll et al. (2007) recognised that in the real world, an intervention cannot always be fully implemented as planned. Nonetheless, adaptation inevitably compromises implementation fidelity.

In relation to adherence (or fidelity to design), consistent with complexity science theory and as noted by Hawe et al. (2004), the focus should instead be on adherence to the steps in the change process or goals of the intervention, rather than the constituents of the intervention themselves. Some authors also acknowledge that fidelity should still be maintained for certain core intervention activities, while less important or adaptable elements at the periphery may be changed to achieve an ecological fit (Durlak and DuPre, 2008, Greenhalgh et al., 2004, Fixsen et al., 2005). In the case of this intervention, although alterations were made to the execution, coverage or duration of the constituent components, the overall ToC still appeared to hold as the causal pathways were the same. Low fidelity to certain constituents could, however, affect

whether key goals were achieved. For example, delays in implementing the WISN method meant that by the end of the evaluation, a set of staffing standards had still not been agreed with government. A limitation of the Carroll framework is that it does not help identify which components are essential to the intervention; Pérez et al. (2015) have proposed a modified version of Carroll's framework which attempts to more comprehensively assess the implementation fidelity-adaptation balance.

By examining adherence to the goals of the intervention, the transferability of the findings can be better understood. Important goals achieved by the intervention included: building the capacity of the health workforce to use a human resource information management system, and engaging key political actors early on in the process as well as communicating the benefits of implementing the intervention, particularly in financial terms. Although the constituents of the intervention could be different to those used in the DRC, other countries looking to implement similar complex interventions - not necessarily confined within the health system but even in other sectors - could aim to achieve the same objectives using slightly adapted strategies.

Limitations

This evaluation was primarily qualitative, and only a limited set of indicators could be measured. This was partly due to a lack of resources but also due to the evolutionary and dynamic nature of the intervention; other than quarterly reports, data and reports developed by implementing partners on the intervention were often received on an ad hoc basis, making it difficult to forecast what data would be available.

Another limitation of the study was that given the sensitivity of the topic and stakeholders involved, it may have been difficult to evoke a truthful response from interviewees. In particular, government officials would have wished to present themselves in a positive light, and so there is a risk their responses were subject to social desirability bias. To establish reliability of the findings, several different perspectives were represented and similarities and differences across accounts compared. The lead author who conducted all of the interviews was also non-Congolese, and so difference in background and beliefs would have further

influenced both the information yielded by participants and how it may have been interpreted.

Although it was not an objective of this study, it would have been desirable to also measure outcomes linked to the intervention. There had been plans to use the baseline and end-line evaluation surveys of the ASSP programme to conduct a controlled before-and-after study. This would have enabled a quantitative comparison of health worker motivation, government payments, distribution, and performance for those workers receiving the intervention in the Kasai provinces against workers from other provinces who had not been exposed to the intervention. However, the security risk posed to researchers as a result of instability arising in the two Kasais in 2016 meant that the end-line survey could not be undertaken in the Kasai provinces. Nonetheless, this analysis still offers credible evidence on the contribution of the intervention to the outcome of improving government payments to workers, which has been reported by Likofata et al. (2017). Key activities of the intervention were implemented as intended, with most elements of the ToC supported and confirmed by evidence on observed results. Furthermore, no other similar interventions to clean the payroll or update staffing standards were being implemented in parallel.

Finally, no negative unintended consequences for the intervention were recorded. Further scrutiny in this area could have been enabled through the development of 'dark logic models', which can be used to guide the evaluation of potential harms and their underlying mechanisms (Bonell et al., 2014).

Conclusion

In conclusion, this study has highlighted that complex health systems strengthening interventions may necessitate an adaptive approach to implementation and evaluation given the dynamic nature of the system within which they occur. A framework of implementation fidelity identified participant responsiveness and context as key moderators of the intervention. Specific to this intervention, securing the engagement from influential actors early on, using financial data to advocate for policy change, and banking reforms ensuring greater transparency around pay were important steps in achieving the intervention's overall objectives.

LIST OF ABBREVIATIONS

ASSP Accès Aux Soins de Santé Primaire/Access to Primary Healthcare

DFID Department for International Development

DRC Democratic Republic of Congo

iHRIS Open-source Human Resources Information System

IMA Interchurch Medical Assistance Worldhealth

ToC Theory of Change

VSAT Very Small Aperture Terminals

WISN Workload Indicators of Staffing Need

Declarations

Ethics approval and consent to participate

The study received human subjects review and approval from the Tulane University Institutional Review Board (Reference number: 14-633280), the Kinshasa School of Public Health Ethics Committee (Reference number: ESP/CE/024/2014), and the London School of Hygiene and Tropical Medicine Research Ethics Committee (Reference number: 8475). Informed written consent was obtained from all those participating in the study.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The lead author has recently been appointed as a health adviser for the Department for International Development (DFID). DFID funded the health systems strengthening programme referred to in the article.

Funding

The study was funded by the UK Government's Department for International Development as part of the ASSP Project (Accès aux Soins de Santé Primaires).

Authors' contributions

RM analysed and interpreted the survey data. RM also designed, collected, analysed and interpreted the qualitative data of the study and drafted the manuscript. JB, SMJ and DRH helped to design the study and write the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We would like to acknowledge the contribution of Dr Natasha Palmer to the design of the study. We also thank Dr Lauren Blum and Anicet Yemenwi who assisted the collection of data for the qualitative component of the study.

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Supplementary file for research paper 6

Additional file 1: Execution and duration of activities described in the Theory of Change

Constituent interventions	Execution status	Details on execution	Duration	
			Expecte d time-line (if known)	Actual time-line
Component One: Generation and utilisation of information to improve governme nt payments to workers				
1. iHRIS software deployed into central, peripheral and zonal levels.	Completed.	Computer equipment was purchased and delivered to key health departments in the central Ministry of Health, as well as the peripheral and zonal levels.	By July 2014	July 2014 **Achieved on time.**
2. Health officials trained in use of iHRIS	Completed.	Training in iHRIS was carried out at the central and provincial levels. At the health zone level, a total of 98 data managers in 44 health zones of Kasai Central and Kasai were trained. Each health zone, provincial health department and the central health departments were given user accounts for iHRIS.	By July 2014	July 2014 **Achieved on time.**
3. Data on Human Resources for ASSP zones in Kasai provinces entered onto iHRIS	Completed.	The details of health workers in the Kasai provinces already registered with the health zone office were imported into iHRIS prior to the census.	By July 2014	July 2014 **Achieved on time.**
4. Recruitment and training of data operators for identification exercise (census).	Completed.	Six teams of four people were recruited and trained in iHRIS, before being deployed across the two provinces to interview and collect data on health workers.	By July 2014	July 2014 **Achieved on time.**
5 and 7. Biometric identification of health workers carried out (census) and data recorded on iHRIS	Partially completed and ongoing.	Health workers from each zone in both Kasai provinces were requested to bring documentary evidence on their qualifications and recruitment in health facilities for review by the trained teams. Those workers identified as legitimate had their contact information, identification, photo, current job, and employment and education history onto the iHRIS database. However, biometric finger-printing as planned was not carried out.	By August 2014.	October 2015-December 2015. **Delayed.**
6. Communities, government and development partners actively approached and involved in biometric identification (census).	Partially completed.	These stakeholders were present during the census, and helped to oversee the verification process. However, biometric identification by way of finger-printing of workers, was not undertaken.	By August 2014.	October-December 2015. **Delayed.**
12. Advocacy with government to use iHRIS data.	Completed.	Following an analysis of census data, IntraHealth and IMA World Health met formally with officials and partners including the Secretary General of the Ministry of Health, Director in charge of payroll at the Ministry of Budget, and the Ministry of Public Service to discuss how to use the information recorded on iHRIS to pay health workers.	By September 2014.	June 2016 following analysis of iHRIS data. **Delayed.**

Component two: Update d staffing norms				
9. Advocacy to use WISN with the government	Completed.	The project conducted a four day workshop on WISN with the Ministry of Health in order to develop the capacity of the Ministry of Health to better understand the WISN process and how it would be applied in the Congolese context.	By June 2014.	June 2014. Achieved on time.
10. Application of WISN methodology to assess staffing needs using data on Human Resources	Completed.	Once approval to proceed had been granted by the Ministry of Health, a WISN Steering Committee and Technical Working Group were established. A strategy and operational plan was developed. The Working Group designed the data collection tools a pilot study was undertaken in Kinshasa. Data collection for WISN was completed in another 4 provinces, namely: Maniema, Kasai, Kasai Centrale, and Nord Ubangi. This included 35 general reference hospitals, and 131 health centres.	By September 2014.	September 2017. **Delayed.**
Components one and two				
8. Data analysed together to produce situational report on Human Resources and data shared with government.	Partially completed.	By the end of the evaluation, the data from WISN and iHRIS had been analysed but not yet synthesized into a situational report for government.	By December 2014.	Not completed by March 2018. **Delayed.**
11. Advocacy work between government and DFID/IMA to commit finances to Human Resources for Health.	Ongoing.	IntraHealth and IMA World Health met with officials and partners including the Secretary General of the Ministry of Health, Director in charge of payroll at the Ministry of Budget, and the Ministry of Public Service to discuss how to use the information recorded on iHRIS to pay health workers. This led the Ministry of Budget to set up a review committee tasked with updating the payroll lists for occupational risk allowances and salaries for the two provinces.	Timeline not defined at outset.	August 2016 review committee to update the payroll was established.

Supplementary file for research paper 6

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5 and 7. Biometric identification of health workers carried out (census) and data recorded on iHRIS	Partially completed and ongoing.	Health workers from each zone in both Kasai provinces were requested to bring documentary evidence on their qualifications and recruitment in health facilities for review by the trained teams. Those workers identified as legitimate had their contact information, identification, photo, current job, and employment and education history onto the iHRIS database. However, biometric finger-printing as planned was not carried out.	By August 2014.	October 2015-December 2015. **Delayed.**
6. Communities, government and development partners actively approached and involved in biometric identification (census).	Partially completed.	These stakeholders were present during the census, and helped to oversee the verification process. However, biometric identification by way of finger-printing of workers, was not undertaken.	By August 2014.	October-December 2015. **Delayed.**
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Component two: Updated staffing norms				
9. Advocacy to use WISN with the government	Completed.	The project conducted a four day workshop on WISN with the Ministry of Health in order to develop the capacity of the Ministry of Health to better understand the WISN process and how it would be applied in the Congolese context.	By June 2014.	June 2014. Achieved on time.
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Components one and two				
8. Data analysed together to produce situational report on Human Resources and data shared with government.	Partially completed.	By the end of the evaluation, the data from WISN and iHRIS had been analysed but not yet synthesized into a situational report for government.	By December 2014.	Not completed by March 2018. **Delayed.**
11. Advocacy work between government and DFID/IMA to commit finances to Human Resources for Health.	Ongoing.	IntraHealth and IMA World Health met with officials and partners including the Secretary General of the Ministry of Health, Director in charge of payroll at the Ministry of Budget, and the Ministry of Public Service to discuss how to use the information recorded on iHRIS to pay health workers. This led the Ministry of Budget to set up a review committee tasked with updating the payroll lists for occupational risk allowances and salaries for the two provinces.	Timeline not defined at outset.	August 2016 review committee to update the payroll was established.

PART IV: DISCUSSION

8. Discussion

8.1 Introduction

At the start of this research, there was little evidence of the sources and levels of income available to health workers in low- and middle-income countries, and no such data available for fragile states. Nor were the drivers of income levels and variations across providers and interactions between sources well understood.

While PBF is a growing source of income in low-income countries, there is limited research on how it affects motivation and more importantly what happens when it is withdrawn. Lastly most research on financial incentives tends to focus on the effects of PBF and user fees on health workers, with much less attention to the role of salaries and how governments may strengthen systems to pay workers.

Therefore, this thesis had the following objectives:

Objective 1: To describe and quantify the sources and levels of income for health workers in a sample of public sector facilities in the DRC.
Objective 2: To develop and validate a scale to measure dimensions of motivation among health workers in the DRC, and compare differences in motivation among health workers where PBF had recently been removed with those who never received PBF.
Objective 3: To undertake a process evaluation of a complex intervention aimed at facilitating government payments to health workers.

This chapter will begin with a summary of the thesis findings in relation to each objective, situating them within the existing literature. The limitations of this work and generalisability of the findings are then discussed. I then reflect on the contribution of this thesis and its policy implications. Finally, areas for future research are explored.

8.2 Summary of key findings

Objective 1
This study indicated that within the DRC, nurses constitute the majority of the primary health care workforce. The analysis of incomes was therefore focussed on this cadre.

The median total income received per month was 85 USD, and mean amount was 165 USD, and all nurses reported low satisfaction with their remuneration. Only 31% of those sampled received a government salary, with a slightly higher proportion of 54% receiving the occupational risk allowance, which averaged a lower amount. These two government payments were considered to be unreliable by workers; amounts were often less than expected and in almost a third of cases were not received on time.

The majority of staff (74%) received user fees, the amount of which received per month was determined by: the user fee tariff set by the facility, patient case load, and number of personnel working at the facility as fees were shared out amongst staff. Over one year, 52% of workers had received at least one per diem from external partners to attend training, but amounts tended to be fairly small. However, almost half of all nurses admitted to undertaking non-clinical activities such as agricultural work to supplement their income. Private practice was far less common, and appeared to depend upon opportunities to practice; those living in urban areas and where villages were situated closer to facilities were more likely to conduct private work. Informal payments were also rarely reported.

In identifying the individual and facility-level determinants of income sources received, gender and provincial location appeared to be significantly associated with differences in types of income received. For example, when controlling for other characteristics, men were more likely to receive a high total income and per diems compared to females, and nurses in Equateur were more likely to receive a salary compared with nurses in Maniema.

Some unexpected findings also arose from the analysis; receipt of government payments was associated with income from private practice. The rationale for this - identified through interviews - was that those workers receiving a government payment at the end of the month were guaranteed their wage irrespective of whether they worked in a facility or not. Yet those workers who were not receiving any government payments did not want to risk losing the opportunity of becoming registered to receive a salary or occupational risk allowance and so were less likely to undertake private work. The latter group of workers tended to be younger, as they had not been captured by the latest census and incorporated onto the payroll.

Most previous studies have examined income sources in isolation, rather than assessing the full set of financial incentives available to workers, with just a few exceptions (Roenen et al., 1997, Akwataghibe et al., 2013). With respect to the DRC, studies have tended to have a focus on the effects of PBF (Soeters et al., 2011, Fox et al., 2013, Huillery and Seban, 2015, Bertone et al., 2018). Investigating the overall level and composition of health workers' income is a relatively new area. The importance of this research agenda has been discussed extensively by Bertone and Witter (Bertone and Witter, 2015). Particularly in low-income countries where workers often receive incomes from a variety of sources, they argue that shedding light on the 'complex remuneration' experienced by workers will enable a better understanding of the causes of variation and fragmentation in income structures and levels, as well as the potential incentives it creates which have consequences for health worker motivation. An exploration of these issues can then inform the design of coordinated and more effective incentive packages, aimed at improving health worker motivation and performance (Akwataghibe et al., 2013, Bertone and Witter, 2015).

Since the start of the research carried out for this thesis, a quantitative examination of the 'complex remuneration' of workers was conducted for the DRC and in Sierra Leone by other authors (Bertone et al., 2016, Bertone and Lagarde, 2016), revealing both similarities and differences to the thesis findings.

After data collection was carried out for objective 1 of the thesis, I was informed of another similar study of health worker remuneration being undertaken on behalf of the World Bank within the DRC. In order to maximise the usefulness of both studies for stakeholders, I liaised with the lead researcher of the World Bank study to ensure complementarity rather than duplication of sampling, and to ensure that comparable data could be collected in the World Bank study. Following discussions, the World Bank agreed to sample health zones in southern Equateur thus avoiding any of the zones sampled in northern Equateur under this study. Other provinces sampled by the World Bank included Bandundu, Katanga and South Kivu, whereas the data for my thesis was collected from Maniema, Kasai Occidental, Kasai Oriental, and Province Orientale.

Despite some differences in scope and methodology (which are further discussed in appendix 10), I was able to synthesise some of the data derived from both studies to

yield a descriptive analysis of health worker remuneration across a broader geographical area of the DRC. Many of the results from the World Bank study confirmed the results in our study, and the final joint report which I lead authored is given in appendix 10. For example, the study by Bertone et al. also found that salaries are received by a minority of health workers and often do not constitute a substantial source of overall income, consistent with the findings in this thesis. As indicated in the joint report in appendix 10, the proportion of workers receiving a salary in the World Bank sampled provinces ranged from 5% to 29% while it ranged from 18% to 39% in our sampled provinces. Incomes such as user fees from patients emerged as a common source of revenue across cadres and provinces in both studies; between 64% to 90% of sampled workers in our study received user fees compared to 72% to 96% of sampled workers in World Bank provinces. However, there was significant variation in the proportion of nurses receiving income from private practice and/or activities outside the health sector between studies (45% of nurses in our study compared to 26% of nurses in the World Bank study). This may partly be explained by the geographical differences in sampling of the two studies, for example the World Bank study sampled overall proportionately more in urban areas compared to our study (21% versus 11% respectively), and opportunities to practice outside the public health system may have varied between urban and rural areas. Furthermore, as identified in this study and by Bertone et al. (2016), the proportion of staff earning from non-clinical activities in the DRC is high, which is consistent with other studies in low- and middle-income countries (Van Lerberghe et al., 2002, Akwataghibe et al., 2013, Roenen et al., 1997).

Although in Sierra Leone salaries often represented the main share of income, health workers in Sierra Leone who had trained after 2010 did not receive a salary as the payroll had not been updated (Bertone and Lagarde, 2016). Unlike what was found in this study and Bertone's study in the DRC (Bertone et al., 2016), user fees were less common in Sierra Leone given the introduction of user fee exempted services under the Free Health Care Initiative (Bertone and Lagarde, 2016).

Objective 2

The first part of objective 2 involved developing and validating a scale which could be used to measure the motivation of DRC health workers. The eleven dimensions of motivation which were confirmed to be relevant to health workers in the DRC context

are presented in table 6 below along with their definitions and link to the Franco framework, which was the principal conceptual framework used (Franco et al., 2002, Franco et al., 2004).

Table 6: Dimensions of motivation and link to Franco framework

Link to Franco framework		**Motivation Dimension**	**Description of dimension**
Determinants of motivation	Individual level	Conscientiousness	Perception of level of discipline, effort and care put into work
		Pride	Pride associated with working in the facility
		Extrinsic motivation	Importance health workers place on external rewards
	Organisational level	Training	Satisfaction with training received and opportunities for training
		Tasks	Satisfaction with workload and variety of tasks performed
		Availability of equipment/ supplies	Satisfaction with availability of resources such as equipment, medical supplies and medications
		Income reflects effort	Degree to which health workers feel income received reflects the amount of effort put into work
		Organizational culture	Satisfaction with relationships with colleagues and management of the facility
		Sufficiency of income	Degree to which health workers feel like their income is sufficient given their basic monetary needs
	Community level	Community relationships	Satisfaction with relationships with local leaders in the community
Outcomes	Behaviour	Turnover intention	Intention to leave the facility

The only two dimensions which were not retained in the final confirmatory factor analysis were: self-efficacy (belief in one's abilities to complete a task), and respect/recognition. This is at odds with findings from Jordan and Georgia where similarities in self-efficacy dimensions were identified (Franco et al., 2004), and in Mali and Tanzania where recognition was identified as a key driver of motivation (Dieleman et al., 2006, Songstad et al., 2012).

The second part of the objective went on to examine differences in scores against each dimension between workers who had recently experienced a withdrawal of PBF (which comprised both a fixed and performance payment) and workers who had never received PBF. Workers who had previously received PBF scored significantly lower on almost all motivation dimensions. The withdrawal of PBF also affected staff retention as many workers left following termination of PBF payments. This also links to objective 1, and illustrates that an understanding of the contribution of income components to overall income is important; given the significant contribution these PBF payments had made to the total income, this may have been a factor in explaining its strong association with health worker motivation. Given the share of PBF as a proportion of total income will vary between different countries, this may limit the generalisability of the findings to other contexts. The findings of objective 2 further highlighted key inter-dependencies in income sources; as PBF was phased out, user fees became an important substitute.

We also found that the level of 'extrinsic motivation' was higher in the previous PBF group compared with the non PBF group (marginally significant). The higher levels of extrinsic motivation could be explained by "crowding out" theory, which posits that the introduction of monetary incentives can cause workers to be more driven by external rewards than intrinsic motivation (Frey and Jegen, 2001, Lohmann et al., 2016). The reduction of intrinsic motivation leads to an undermining of an individual's sense of autonomy and competence, which can have negative consequences for performance and therefore health service delivery (Deci et al., 1999, Kao, 2015).

Only one other study was identified that examined how PBF withdrawal may affect health worker motivation, and this was by Huillery and Seban in the DRC (Huillery and Seban, 2015). It reported that workers were less motivated following withdrawal of a performance payment compared with a fixed payment of the same amount. However, unlike our study, it did not quantitatively examine how the withdrawal affected a greater range of dimensions of motivation, nor did it include a qualitative component. For example, Huillery and Seban operationalised motivation in a different way; staff attendance provided the measure for total motivation (extrinsic plus intrinsic motivation) while other important dimensions of motivation were identified by asking workers about one advantage and one disadvantage of their job. In contrast, our study was able to quantify the relative importance of different dimensions of motivation to

workers and how each of these were affected by the withdrawal of PBF. In addition, the qualitative component of our study helped to unpack the reasons behind the observed differences in motivation.

Other studies have examined the effects of withdrawing donor funding in general. In Zimbabwe, a corruption scandal in 2009 within the Ministry of Health caused the Swedish International Development Cooperation Agency to freeze all of its funding to the health sector. This was followed by a decline in performance in antenatal care, maternal and new-born health, tuberculosis, malaria, and diarrhoeal and respiratory infections (Usher, 2015). Similarly, the cessation of incentive payments to Ministry of Health staff in Liberia by DFID led to a loss of existing qualified staff and increase in fees at point of service (Department for International Development, 2011).

Objective 3

Under this last objective, the steps and processes underpinning an intervention to improve government payments to health workers were comprehensively described. To a large extent, most activities were successfully implemented as intended, with the exception of some which were politically-sensitive such as the biometric identification of workers. Certain intervention activities not originally foreseen included a political economy analysis which eventually informed stakeholder engagement. External factors outside of the sphere of control or influence of the intervention also facilitated success; for example, the introduction of 'bancarisation' - which refers to the establishment of bank accounts to pay employees - proved a significant incentive to government to update the payroll. This was because any payments made to non-existent workers would gradually accumulate at the bank and any unclaimed funds would be returned to the central bank rather than the Ministry of Health, resulting in significant financial losses for the government.

Interventions to improve the payroll in post-conflict states have been described in Sierra Leone, South Sudan, Somaliland, and Puntland state of Somalia (Goldsmith, 2011, Simson, 2013), which have been presented as case studies. Unlike other studies of this specific type of intervention, this is the first study to apply a theory of change approach to evaluate the process of implementation. In so doing, it has helped to articulate the causal mechanisms through which the intervention has achieved its outcomes. Using a

framework of implementation fidelity, it has also identified which elements have contributed to its success, which is critical to informing effective replication elsewhere.

8.3 Limitations

The implications for this thesis of undertaking research within an adaptive health systems strengthening programme and in an unstable political environment are firstly discussed. A number of methodological limitations, many of which have already been described in relation to each studied objective within each of the results chapters, are then briefly summarised.

8.3.1 Adaptive programming and context influencing study design

A major challenge with this thesis has been ensuring the research has kept abreast of changes occurring in the programme, which also resulted in some of the limitations observed. Originally, I had intended to undertake a controlled before-and-after study to measure the effects of PBF withdrawal on health worker motivation. However, I had to modify the research design to a cross-sectional study due to a decision occurring within the programme to phase out PBF payments before the baseline survey could be undertaken in order to free up the programme budget for other health system activities. A cross-sectional study design did not allow us to attribute causality to the relationship between the withdrawal of PBF and motivation within objective 2 because the exposure and outcome were simultaneously assessed, therefore the existence of a temporal relationship between exposure and outcome could not be established; a controlled before-and-after study, on the other hand, would have had the strength of temporality to more robustly assess whether the outcome was impacted by the intervention. In addition, by the time the quantitative and qualitative data were collected, performance payments had stopped for one month and eight months respectively. Since many of the original workers were reported to have left facilities once performance payments ceased, it is possible that stronger reactions would have been observed in the in-depth interviews had they occurred closer to quantitative data collection. Unfortunately, it was not possible to undertake the interviews sooner due to the need to gain authorisation from DFID to proceed with the study as well as the necessary ethics approvals.

Another example of where programmatic changes impacted on the research was in relation to objective 3. I had originally planned to use the baseline and midline (planned for March 2016) evaluation surveys of the ASSP programme to conduct a controlled before-and-after study to examine the effect of the intervention to improve systems for paying health workers on various intermediate outcomes. These outcomes, as described in the theory of change, would have included changes in: motivation levels, proportion of workers receiving government payments, distribution and performance of workers receiving the intervention in Kasai Occidental (the only province where the intervention was being piloted). The same measures were to be collected at baseline and midline in Equateur where workers were not exposed to the intervention. Difference-in-difference analysis using ordinary least squares with standard errors clustered at the facility level was then going to be applied to assess the independent effect of the intervention to improve systems for paying health workers on each of the outcome variables. The results of the research were then to inform whether the intervention to improve the integrity of the payroll would be scaled-up in other ASSP provinces.

Yet, given the extensive delays in implementing the intervention in Kasai Occidental, and a decision not to undertake a midline survey, it was decided by the donor and implementing partner that the intervention would be scaled up to other provinces in the absence of an evaluation. The contingency plan was then to evaluate changes in outcomes affecting workers in Kasai Occidental before and after the intervention without a counterfactual.

However, in 2016, the death of a local leader in Kasai Occidental prompted a bloody insurgency and months of fighting between the army and newly formed militias. The violence resulted in hundreds of thousands of internally displaced people, with many civilians caught in the conflict leaving everything to flee across the border to Angola. The security risk posed to researchers as a result of this situation meant that the endline survey (which was executed between July and September 2017) was not undertaken in Kasai Occidental. Hence, a complete evaluation of both process and outcomes of the intervention to improve government payments under objective 3 was not possible.

The tensions between health programming and undertaking robust research to inform implementation have also been described in Malawi (Gooding, 2017). Often,

implementing partners prioritise service delivery activities over research needs as they have been contracted to deliver results. This made it difficult to challenge programmatic decisions which eventually impacted on the robustness of the research. As a result, this research needed to be flexible and responsive to changes both in programme design and implementation plans. For example, I had to change the study design for objective 2 from a controlled before and after study to a cross-sectional study as partners had already phased out PBF payments before the baseline study was implemented. I also adapted the study design for objective 3 once the midline was cancelled to take a more in-depth qualitative approach. In addition, I had to change the timing of key informant interviews for objective 3 when implementation of the intervention became substantially delayed. As a result of the dynamic and uncertain environment within which I conducted this research, I ended up with more of a methodological and reflective focus than I perhaps otherwise would have had. If I had the opportunity to do this again, I would have borne this in mind when initially designing my research and thinking through various contingency plans in advance, though in practice this would not have resulted in any changes to the study itself. Having the capacity to be flexible is particularly relevant in the context of fragile states, where the political situation is rapidly changing. As was the case here, it can be difficult to achieve the balance between undertaking rigorous evaluative research which requires time and control areas, with policy desires to scale-up and maximise intervention reach.

8.3.2 Methodological limitations

Sampling

The sampling methodology for the quantitative surveys undertaken for objective 1 and 2 has been described in detail in chapter 4. One of the limitations of the health worker survey was that it only captured the views of those workers present on the day of the survey and the level of staff absenteeism could not be quantified. The extent to which this selection bias may have influenced the findings could not be determined; for example, it could be that workers sampled on the day of the survey were more motivated (as they were at work) compared to those who were not present in facilities that day. To reduce this bias, data collectors could have returned to facilities at another date or tried to reach workers in their homes, but this would have significantly increased the costs associated with the surveys. This issue, although acknowledged by others

(Bonenberger et al., 2014) has generally not been addressed in the wider literature but could be an area for future research.

For objective 2, as coverage of PBF had been determined by the geographical focus of the previous health programme and sampling of health facilities was not undertaken with respect to PBF status but rather to evaluate the ASSP programme, the number of workers in the previous PBF and non PBF facilities were very different and had varying characteristics. Although the study was not powered to examine differences in motivation across these sub-groups, significant differences were still detected. Furthermore, the quantitative analysis was able to control for a range of health worker and health facility characteristics. Another limitation is that given the vastness of the DRC, there is a risk that the results were not representative of the country; only 2.3%[9] of the overall number of primary health centres in the DRC were sampled. However, the similar results from this analysis to the World Bank study on health worker remuneration suggests findings may be representative.

Purposive sampling in only one province was used to identify nurses for qualitative interviews under objectives 1 and 2. This is a type of non-probability sampling technique which is highly prone to bias given that the researcher has deliberately selected participants due to certain qualities they possess. However, this was deemed the most pragmatic approach given the context of the DRC, where access and security constraints prohibit the collection of data from many areas. A key limitation was that only 16 nurses were interviewed and additional interviews were not factored into the data collection plan; although no new themes had been uncovered by the end of the interviews, the ability to interview a larger sample may have provided more confidence that saturation had been reached. Furthermore, workers were only sampled in one province; sampling in multiple provinces would have helped to elucidate potential drivers behind the variation in incomes observed between sampled provinces.

Design of data collection and analysis

The rationale behind each choice of method used to collect data under each objective has been described in chapter 4. For objectives 1 and 2, the major challenge was

[9] Calculated using population data obtained from the Direction d'Etudes et Planification, Ministère de la Santé Publique in October 2013.

ensuring truthful responses were gained from respondents. Direct questioning was employed but would have been susceptible to social desirability bias, whereby respondents' perceptions of what constitutes an acceptable answer or what they think the researcher wishes to hear may have influenced their responses (Fisher, 1993). It could also have led to an under-reporting of more sensitive incomes, such as informal payments or earnings from other illegal activities, which have been found to be an important source for workers in low-income countries (Stringhini et al., 2009, Van Lerberghe et al., 2002, Mcpake et al., 1999).

There are techniques, such as unfolding brackets discussed in chapter 4 which may help to reduce this bias (Paulin, 2003), however this was not applied as this would have substantially increased the number of questions and health worker incomes was only one of several areas explored in the survey. It was also not possible to cross-validate responses from other databases as there is no robust documentation of health worker incomes in the DRC. However, attempts were made to triangulate findings with data obtained from qualitative interviews. In addition, the results observed correlated well with results from another study by the World Bank which had used the unfolding brackets technique to estimate amounts received from different sources of income, suggesting this method didn't yield very different estimates from direct questioning (appendix 10). Many of the questions also required respondents to quantify payments received over the past month; for infrequent and/or unpredictable payments such as per diems, it may have been difficult to report this accurately as the recall period was over one year, resulting in a degree of recall bias. It was not possible to identify whether this bias may have affected reporting; while a shorter recall period could have mitigated against this, it may have yielded a less accurate picture of the extent to which per diems were paid.

With respect to the quantitative analysis for objective 2, since there was no prior experience of measuring motivation in the DRC context, a broad range of dimensions were initially included in the survey. However, this had to be traded off against having a questionnaire of manageable length so only a few items could be included per construct. It would have been useful to have undertaken qualitative work to inform the development of the survey tool to allow it be more contextually-driven (Chandler et al., 2009), but this was not possible within the timeframe of implementing the survey.

In addition, the regression analysis of differences in motivation between PBF and non-PBF groups did not include other incomes or total income received as explanatory variables. As seen in supplementary table 4 from paper 3, there were some differences in levels of different sources of income received by the PBF and non-PBF groups, which could have affected motivation independently of PBF. For example, workers in areas which had never had PBF were more likely to have received a government salary, and the overall income level (including income from all sources) was higher, which may have made them more motivated. Furthermore, the receipt of PBF may have influenced the receipt of levels of other income sources, such as user fees.

For objective 3, the evaluation was primarily qualitative, and was unable to report on outcomes achieved. The reasons for this have been elaborated in section 8.3.1 on "adaptive programme and context influencing study design". Another limitation was that I was the only researcher coding interviews for objective 3 due to resource constraints; having another researcher code the same data would have improved the reliability of the qualitative research with regards to stability - ensuring codes did not change over time - as well as reproducibility - where the concern is whether different coders would code the same data the same way (Campbell et al., 2013). In chapters 6 and 7, a deeper reflection of the methodological limitations with respect to the design and analysis of data collection is given; specifically for the approach to measuring motivation for objective 2, and the process of developing a theory of change in objective 3.

For all objectives, more steps could have been taken to improve the transferability of the qualitative research findings. These included using a range of qualitative methods such as narrative interviews and focus groups rather than just in-depth interviews to allow for triangulation of the findings, and purposive sampling to saturation. Thicker descriptions of experiences during data collection providing a richer and fuller understanding of the research setting and study participants would have also helped other researchers judge whether the findings could be extrapolated to similar contexts or settings (Geertz, 1973, Lincoln and Guba, 1985).

Reflexivity

Given most of the research undertaken was qualitative in nature, it was important to consider throughout how my positionality may have influenced the findings gained from interviews, a practice known as reflexivity (Finlay, 2002). Reflexivity was exercised during interviews as described in chapter 4. Here, I reflect on how my background, beliefs and values may have interacted with the research process. During the time of fieldwork, I was affiliated with Tulane International (a wholly owned subsidiary of Tulane University based in DRC) as well as being a PhD candidate with the London School of Hygiene and Tropical Medicine. I am also female, of Indian descent but born in the United Kingdom, and am in my thirties. Furthermore, the DRC is a francophone country and although I have a good standard of French, I would not say I am a fluent speaker.

My characteristics were therefore very distant to those of the respondents, so I was regarded as an outsider. More often than not, foreigners in the DRC either work for a multilateral organisation such as the United Nations, an NGO or a donor. Therefore, assumptions were usually made at the outset that I was able to influence decisions made by the programme, for example, that I had the authority to re-instate PBF payments. Despite explaining my role as an independent researcher, some participants still felt the need to strongly lobby for certain changes to be made to the programme. In these cases, it helped to have a fellow Congolese researcher by my side, who was able to explain the situation more articulately in French than I could.

Yet, irrespective of my organisational identity, being from a developed country meant respondents viewed me as someone from a wealthy background who would potentially give them money. Having lived in Kinshasa for at least a year before commencing the research, I was used to the culture of regularly being asked to pay bribes, for example by police officials, and felt comfortable saying no. However, in the research setting, refusing an interviewee's request for money occasionally created an awkward dynamic which was difficult to overcome. In those cases, I had to acknowledge that my presence was more likely to inhibit the process, so requested my fellow researcher undertake the interview without me and we would then have a verbal debrief afterwards on what I had missed in order to clarify whether further questions needed to be posed to the participant.

Interviewing government officials also had its challenges. In 2016, two international researchers were very publicly expelled from the country.[10] This led to an overall increased suspicion of researchers by civil servants, and may have resulted in more guarded responses. When conducting interviews for objective 3, one particular official requested not to be recorded.

Following each interview, I had a short debrief session with the local Congolese researcher. This was particularly helpful as it allowed me to sense-check my interpretation alongside someone much more familiar with the cultural context. Iterative discussions with supervisors, Congolese colleagues and outsiders also aided me to reflect on my positionality as a researcher.

8.4 Generalisability of the findings

The DRC health system exhibits many of the features which are observed in a fragile or post-conflict state, such as: insufficient medical equipment, supplies and infrastructure; non-operational health information systems; weak regulatory and managerial capacity; ghost workers and an inequitably distributed workforce (Newbrander et al., 2011, Tulloch et al., 2011). The phenomenon of disjointed donor programming which begins in the immediate post-conflict period is common, with performance based contracting often employed as a mechanism to deliver services (Bornemisza, 2002, Tulloch et al., 2011). Therefore, the findings of this thesis will be of relevance to other post conflict settings which are likely to share some of the same attributes.

The quantitative analysis for this thesis was conducted in a limited number of provinces of the DRC. This raises questions over the extent to which the findings can be generalised to the entire country as well as other similar countries. In this case, the findings on health worker remuneration were broadly consistent with the World Bank study which mainly covered other provinces in the DRC (Bertone et al., 2016) but indicated some differences when compared to Sierra Leone, which is also a post conflict

[10] Jason Stearns, director of the Congo Research Group at New York University, was expelled from the country in April 2016 publishing a report linking soldiers to the massacres of civilians. In August 2016, the government also revoked the work permit of Ida Sawyer, senior Human Rights Watch researcher, without providing a reason for the denial of the permit.

state (Bertone and Lagarde, 2016). Differences included the greater proportion of workers receiving user fees in the DRC while a higher proportion of workers received a salary in Sierra Leone. This implies there will be contextual differences in remuneration structures, however the range of income sources received was broadly similar.

The findings on health worker motivation were consistent with other studies in highlighting the importance of non-financial as well as financial incentives as determinants of motivation (Willis-Shattuck et al., 2008). However, the literature also suggests the importance of undertaking context-specific research and ensuring motivation measurement scales are locally relevant, given that factors affecting health worker motivation can show significant inter-country differences (Prytherch et al., 2012).

Finally, one of the main reasons for employing a theory-based approach to the evaluation of the intervention to improve government payments to workers, was so that some of the lessons learned could be transferred to other settings. Our findings illustrated that adaptation of the constituents of the intervention was often necessary to ensure this change was brought about successfully (Durlak and Dupre, 2008, Fixsen et al., 2005, Greenhalgh et al., 2004, Hawe et al., 2004). Furthermore, the influence of certain actors was critical to ensuring success, and in this respect a political economy analysis proved valuable in securing their engagement. In particular, contextual factors were key to determining success. This included the introduction of 'bancarisation'; it is possible that the same level of success would be observed in fragile states employing similar technology to improve the transparency of accounting. Researchers evaluating a similar complex health systems strengthening intervention in other countries still need to ensure that they have a comprehensive understanding of the prevailing context, which will inevitably vary from setting to setting.

8.5 Contribution of the thesis

8.5.1 Methodological contributions

The work presented under objective 1 builds on relatively new research in the area of 'complex remuneration'. At the time of designing the study there was no evidence on the determinants of different income sources using regression analysis, though

descriptive assessments of income levels were available. However, since the research was underway, other studies have used similar methods in Sierra Leone as well as the DRC (Bertone et al., 2016, Bertone and Lagarde, 2016). Nonetheless, this study is unique in that it has a mixed methods design, introducing qualitative insights which provide a deeper understanding of the role of context and health worker attitudes towards a variety of income sources, as well as the process underpinning the receipt of these sources of income in the DRC. The qualitative component also helped to substantiate the quantitative findings and shed light on the reasons behind some of the results observed, for example why many workers chose not to engage in private practice. Furthermore, this study for the first time examines the interdependency of different sources of income and the impact of receiving government payments on the receipt of alternative income sources. It was examined by including income source variables within regression models to identify any significant associations and found it to be highly relevant. For instance, those workers receiving a government payment were more likely to engage in private practice compared to those workers who did not receive any form of government payment.

The development of scales to measure health worker motivation in low- and middle-income countries is not new. However, what makes this work different from most is that it is one of the few to employ confirmatory factor analysis to validate the scale (Dale, 2014, Lohmann et al., 2017, Lohmann et al., 2018), as well as measurement invariance testing to ensure different subsamples can be meaningfully compared (Lohmann et al., 2018, Lohmann et al., 2017). Measurement invariance testing is usually only performed in a confirmatory factor analysis framework; where other studies have employed exploratory factor analysis to develop motivation scales and are therefore unable to test for measurement invariance, this methodological innovation is key in identifying whether any subgroup differences are not due to differences in motivation but rather differences in the performance of the measure in these subgroups (Vandenberg and Lance, 2000).

In addition, using a theory-based approach to evaluating an intervention to improve government payments to workers has not previously been attempted; this study has therefore shown the feasibility of applying this approach to programmes outside the health sector that impact on health. This approach enabled me to identify critical factors

enabling the effective implementation of the intervention, which may then be used to inform the delivery of similar interventions to improve government payments to workers in other settings.

Finally, throughout this thesis, I have tried to reflect deeply and honestly on the methods used, and recounted how I would have done things differently knowing what I know now. Descriptions of the short-comings of the methods used and how they were applied, specifically with respect to developing a motivation scale and a theory of change respectively, have been either submitted or published (chapters 6 and 7), with the intention of helping to improve future practice by other researchers working in these areas.

8.5.2 Contribution to the knowledge, policy implications and recommendations

This thesis makes some important contributions to knowledge, some of which can be linked to clear policy implications and recommendations.

The research was undertaken in a country which is notoriously evidence-poor. Information systems are weak and efforts to collect data from more remote areas are often hampered by logistical challenges posed by the difficult terrain, such as a lack of roads. This has meant that stakeholders have relied on their own experiences or anecdotal reports within the health sector to inform their judgements. However, this research has now provided policy-makers robust evidence which will be useful for informing national discussions around the coordination of different actors on health worker remuneration. Specific policy issues to be addressed by government include: increasing the budgetary allocation to health to permit a wage increase for workers – trends indicate a steady increasing budget allocation to health from 4.5% in 2013 to 8.6% in 2015 (United States Agency for International Development, 2016, Secrétariat Général, 2013); updating the amounts of salary and occupational risk payments which should be received by workers by grade and qualification and instituting a standard user fee policy which is communicated to the public in order to deter informal payments and promote trust between communities and health workers;

extending ‘bancarisation’ to all workers to improve transparency of payments; and sanctioning workers who are regularly absent from work yet receiving a salary/occupational risk allowance.

However, addressing each of these issues in turn may be challenging. Firstly, increasing the health budget may be difficult to achieve given fragile and conflict states are characterised by weaker fiscal capacity as a result of lower economic growth rates, higher levels of government debt, and a lower tax revenue to Gross Domestic Product ratio (Jowett et al., 2019). Furthermore, social sectors are less prioritised by fragile states, with conflict tending to depress health expenditure (Witter, 2012). As a result, there is a high dependence on external funding. In the interim, donors may support governments by channelling and pooling funds through domestic public systems; where this is not possible, substitute mechanisms should be established which replicate public functions, with an ultimate vision to transition these mechanisms to domestic ownership (Jowett et al., 2019).

Financing mechanisms themselves can be used to leverage domestic funding as well as improve governing capacity while providing greater authority to governments. The DRC has recently become a recipient of the Global Financing Facility, which aims to support governments in identifying key health priorities and crowd in a broader array of partners to jointly invest in cost-effective interventions. The Global Financing Facility platform has directly supported the prioritisation of health in the budget, increasing the share of health in the government’s budget through the country investment case for reproductive and maternal child health financing strategies, identifying high-impact interventions and efficient service modalities (World Bank, 2019). It has also provided technical assistance to evaluate the fiscal space for health in the DRC, supporting more effective dialogue between the Ministry of Health and the Ministry of Finance. This is a key step in helping to identify and mobilise sources of additional public domestic funds for the sector.

Secondly, enforcing standard policies particularly with respect to user fees may be difficult to achieve. For example, the DRC already has a policy to subsidise or exempt payments for care from a range of patients, such as those affected by tuberculosis,

malaria, pregnant women and children under five, and other vulnerable populations, but this is rarely applied in practice (Médecins Sans Frontières, 2017).

With respect to bancarisation, encouragingly it is one of the few reforms being carried out under the Congolese government's own initiative with almost no donor involvement (Moshonas, 2019). However, it may not eliminate all instances of payroll fraud; for example, fictitious names may still be added to the payroll by influential civil servants with the complicity of payroll department officials.

Fourthly, Sierra Leone succeeded in instituting a functional attendance monitoring system within health facilities. Sanctions for non-attendance were also well-understood at all levels and salaries withheld for nonattendance in line with a Conduct and Sanctions Framework (Simson, 2013). However, salary deductions were not always implemented promptly resulting in some areas still experiencing high non-attendance rates, highlighting the importance of having responsive systems in place.

With respect to other development partners, it is recommended that they make more of an effort to standardise amounts of other sources of income to workers such as per diems and PBF. Furthermore, partners need to ensure equitable distribution of these payments rather than leaving it to the discretion of facilities which can cause conflict between staff. The fragmentation of donor initiatives and inconsistent policies around performance payments has long been recognised, but this research illustrates the extent to which such payments may influence health worker's total incomes. Nonetheless, positive developments to improve donor financing and coordination are already underway; in 2017, a *contrat unique* (single contract) was started in eight of the newly formed 26 provinces (Ministère De La Santé, 2016). This contract is between the provincial Ministry of Health (purchaser), and provincial health authority (provider of health services), and development partners. Its objective is to pool domestic and external financial resources to support one integrated provincial health plan.

The relative importance of different dimensions of motivation are known to vary between countries. This research is the first to provide an understanding of motivation dimensions for workers in the DRC. Policy makers will also find this research useful in designing incentive structures which consider financial as well as non-financial

incentives. For example, health workers were found to be very dissatisfied with non-financial factors such as the availability of equipment and supplies, and training; addressing these issues could serve to significantly enhance motivation.

Globally, donor funding directed towards human resources for health, which includes salary complements and per diems, was 1.5 billion USD in 2016 (Micah et al., 2018). However, there are increasing efforts by the international community to help countries move towards fully funding and implementing their own programmes independent of external aid and taking on a systems strengthening approach. Recently, global health institutions such as the Global Alliance for Vaccines and Immunisations and the Global Fund, have clearer policies aimed at holistically strengthening health systems, including human resources, and have also adopted eligibility and transition frameworks for the countries they support (Patel et al., 2015). These frameworks outline criteria defining countries no longer eligible for further support alongside a timeline to phase out external aid (Silverman, 2018). It is therefore hoped that the study is useful in highlighting the difficulties and opportunities in transitioning from donor-led to domestic financing of human resources.

The study on PBF withdrawal also comes at a time when the sustainability of PBF is being called into question by academics (Paul et al., 2018). As such, there have been more calls for research into understanding the implications for health systems of terminating PBF (Paul et al., 2018, Suthar et al., 2017). This thesis responds to these calls, and should therefore be taken into consideration when introducing new PBF strategies or when programmes are considering discontinuing PBF. For example, governments and donors should ensure any new PBF initiatives are designed to be financially sustainable and have a realistic and properly costed exit strategy, particularly given their potential to 'crowd out' intrinsic motivation. This strategy should ensure there is government buy-in to integrate PBF into domestic purchasing systems once donors exit to minimise any adverse consequences of withdrawal.

Lastly, uncovering the implementation processes and challenges of an intervention to support the payment of health workers by government in fragile states will have important implications for future continued work on health worker pay reform. It is also

of value to other sectors in the DRC seeking to reform civil service pay, such as education, given most of the Ministries involved will be the same.

8.6 Directions for future research

Several avenues for future research have been identified. As previously outlined, this is one of only a few studies to comprehensively examine the phenomenon of 'complex remuneration' (Bertone and Witter, 2015). This is a research agenda which needs to be prioritised in other countries, particularly post-conflict settings, in order to better understand the financial environments within which health workers currently operate. By better understanding the issue, the causes of revenue fragmentation can be more effectively addressed. However, beyond quantifying the contribution of each income source and potential interactions between income sources, this thesis only focusses on PBF and salary payments thereafter. It would be useful if future studies could examine how each source of income influences health worker motivation and performance in order to inform the best mix of financial incentives, as well as the extent to which the source of funding (government/donor) and differences in accountability mechanisms bear impact. For example, does motivation and performance actually improve in health workers once they start receiving a government salary?

The main limitation of the work on PBF withdrawal was that its cross-sectional study design was unable to link cause and effect, however the consistency of findings yielded by our qualitative and quantitative analysis supports the hypothesis that PBF withdrawal negatively impacted health worker motivation. Future studies examining PBF withdrawal should attempt to employ quasi-experimental designs, to more conclusively demonstrate the impact of the withdrawal of financial incentive payments on motivation and health service delivery outcomes. This would lend weight to the credibility of the findings, particularly if trying to convince PBF communities of practice.

Given many of the sources of income described have evolved as a result of a poorly functional state system, it would be interesting to repeat the analysis of health worker remuneration levels and sources, as well as motivation and behaviour once the DRC payroll system becomes more functional. It has been hypothesised that a stronger single principal may reduce the dependency on other sources of income (Ensor and Witter,

2001). For example, there is some evidence that increasing salaries of health workers reduces dual practice and also embezzlement within healthcare institutions, indicating that motivation may align more with organisational goals once financial needs are adequately met (Barr et al., 2004).

Similarly, it would be useful to understand the extent to which strengthening civil service pay contributes to state legitimacy and the rebuilding of the social contract between government and Congolese society (Witter, 2012).

8.7 Concluding remarks

I believe the quote below sums up some of the observations within this thesis.

'The temptation in post-conflict situations is for a greater degree of international intervention in domestic health policymaking. But such an approach neither builds local capacity nor represents a demonstration of good government. Indeed, it may even serve to foster long-term dependency and undermine the government's credibility. If health and medical care is indeed going to be an area in which governments can demonstrate that they act in the interests of the populace and re-establish the social contract it is vital that health policy is made at the national government level, and not in Washington or London.' (Rushton, 2005)

For several years following the Second Congo war, international actors in the DRC have mainly been focussed on delivering results within the health sector. This has encouraged the proliferation of different income sources for workers, as well as initiatives (such as PBF) being set up in parallel to the government system. Thoughts about state-building were relatively neglected. However, the research undertaken within this thesis has shown that international actors in post conflict states need to increasingly work with government to strengthen their capacity, rather than engage in complex programming which substitutes the role of the state and cannot be sustained over the long-term. The DRC is an extreme case but the range of issues presented in this thesis exist in most low- and middle-income countries.

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Appendix 1: Criteria for facility-based scoring for PBF

CRITERES DE PERFORMANCE DU CENTRE DE SANTE

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
1	Tenue de réunions mensuelles de CODESA avec PV et liste des présences avec signatures.	Au moins une réunion ordinaire par mois où l'IT présente le rapport des toutes les activités du CS.	- PV de réunions du CODESA et liste des présences - Copies du PV envoyées au BCZ et archivées au CS	Tenue de la réunion ordinaire avec PV et liste des présences signées = 3 Absence de réunion = 0	**/3**	La réunion du CODESA a lieu une fois par mois avec C.R et liste de présences et des recommandations
2	Recommandations de réunions de CODESA de la période évaluée mises en œuvre à au moins 50%.	Nombre d'actions ou recommandations mises en œuvre / nombre total d'actions ou recommandations identifiées dans la réunion du CODESA.	- PV de réunions du CODESA - Copie envoyées au BCZ, et archivées au CS	50% ou plus d'activités mises en œuvre = 2 Moins de 50% = 0	**/2**	Considérer les recommandations de deux premiers mois du trimestre évalué.
3	Recommandations de supervisions de la période évaluée mises en œuvre à 80% ou plus.	Nombre d'actions ou recommandations mises en œuvre / nombre total d'actions ou recommandations formulées lors des supervisions au cours de la période.	- Cahier de supervision - Registres d'activités	80% ou plus d'activités mises en œuvre = 5 Moins de 80% = 0	**/5**	Le dernier mois du trimestre sera évalué au trimestre prochain.
4	Les supervisions de(s) Poste(s) de santé (et Sites de soins) réalisées par l'équipe du CS.	Nombre de supervisions réalisées au(x) Poste(s) de santé (et Sites de soins)/Nombre de supervisions prévues.	-Cahiers de supervisions au BCZ. -Calendrier de supervisions -Rapports de supervisions archivés au CS avec copie au BCZ.	100% de supervisions réalisées = 5 Moins de 100% = 0.	**/5**	Les Postes de santé (et sites de soins) doivent être supervisés au moins une fois par mois par l'IT ou l'IT .A
5	Tenue de réunions mensuelles d'unité fonctionnelle du CS avec PV et liste de présences.	Réunion d'analyse des indicateurs de l'aire de santé avec compte rendu et liste de présences.	- Compte-rendu de la réunion du monitorage de l'aire de santé avec copie envoyée au BCZ et archivée au CS.	Tenue de la réunion de monitorage de l'AS avec compte-rendu et liste de présences = 2 Absence de réunion ou réunion tenue sans compte-rendu ni liste de présences = 0	**/2**	C'est au cours de la réunion du monitorage interne que l'équipe du CS analyse les indicateurs de l'aire de santé et dégage des solutions aux problèmes identifiés.

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
6	Les recommandations de la réunion de monitorage de l'aire de santé mises en œuvre à 80% ou plus.	Nombre d'actions ou de recommandations du monitorage mises en œuvre /le nombre total d'actions ou de recommandations formulées.	- PV de la réunion mensuelle de monitorage de l'aire de santé. -Liste de présences. - Liste des recommandations (monitorage de l'aire de santé).	80% ou plus d'activités mises en œuvre =3 Moins de 80% = 0	**/3**	Disponibilité du PV de la réunion de monitorage de l'aire de santé (responsabilité du CS).
7	Les recommandations de revues mensuelles mises en œuvre à 80% ou plus.	Nombre de recommandations de revues mensuelles mises en œuvre /le nombre total de recommandations formulées.	-Liste de recommandations de revues mensuelles.	80% ou plus de recommandations mises en œuvre =3 Moins de 80% = 0	**/3**	
8	Suivi correct des ordinogrammes pour toutes les consultations curatives.	- Suivi correct des ordinogrammes signifie : la cohérence entre plaintes-diagnostic et diagnostic-conduite à tenir (de la porte d'entrée au diagnostic et traitement).	- 30 fiches de consultations curatives pour la période dont 10 par mois - Registre de consultations curatives - Ordinogrammes	24 fiches de consultations ou plus sont correctes avec les ordinogrammes = 5 Moins de vingt-quatre fiches correctes = 0	**/5**	- Examen Physique correct - Diagnostic exact - Prescription correcte et rationnelle (≤3ME par épisode) - Dispensation et conditionnement correct.
9	Taux d'utilisation des activités curatives > ou égal à 50% pour Banalia et Bengamisa et > ou égal à 60% pour Ubundu.	Nombre de NC de l'aire de santé reçus / Nombre de NC de l'aire de santé attendus au cours de la période.	- Rapport SNIS - Registre de consultations curatives.	Supérieur ou égal à 50% pour Banalia et Bengamisa et supérieur ou égal à 60% pour Ubundu = 4 Inférieur à cela signifie 0.	**/4**	-Ce critère tiendra compte de la disponibilité des 9 médicaments traceurs dans les structures de santé. -En cas de discordance des données, il faut considérer celles du Registre.
10	Le calendrier mensuel des activités programmées est affiché et respecté à 80 % ou plus.	Nombre d'activités réalisées durant la période / Nombre d'activités prévues pour cette même période.	Plan d'activités du CS : -Supervisions de PS -Vaccination -Soins curatifs -CPN et CPoN -CPS -Visites à domicile -Réunion de monitorage de l'AS -Réunion d'unité fonctionnelle.	Supérieur ou égale à 80% = 5 Inférieur à 80 % = 0	**/5**	-Les activités réalisées doivent être appuyées par un support (document ad hoc). -Ce calendrier doit être signé par l'IT et le Précodesa.

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
			-Rapport d'inventaire médicaments, matériels mobilier et équipement			
11	Couverture vaccinale de DTC3 > ou égale à 80%.	Nombre de NC de l'aire de santé reçus / Nombre de Cas aire de santé attendus au cours de la période.	- Registre de vaccination Formulaire 1 Fiche de pointage Rapport SNIS du CS.	> ou égal à 80% = 5 Inférieur à 80% = 0	**/5**	Pour la couverture supérieure à 100%, il faut une explication approfondie.
12	Taux de Perte de vaccins lyophilisés < ou = à 50 % et pour les autres < ou = à 25 %.	- Nombre de doses administrées / Nombre de doses reçues par antigène au cours de la période.	- Cahier des réquisitions - Fiche des pointages - Registres de vaccination et de CPN - Formulaire 1	- Taux de perte des vaccins lyophilisés inférieur ou égal à 50%=3 - Le contraire de ça = 0	**/3**	- Le taux de perte de 50% = BCG, VAR et VAA.
13	Taux de perte de vaccins non lyophilisés < ou = à 25%	-Nombre de doses administrées/Nombre de doses reçues par antigène au cours de la période	- Cahier des réquisitions - Fiche des pointages - Registres de vaccination et de CPN - Formulaire 1	Taux de perte des vaccins non lyophilisés inférieur ou égal à 25%=2 - Le contraire de ça = 0	**/2**	- Pour les 25%, il y a VPO, VAT et le Pentavalent ou DTC.
14	Taux d'abandon DTC < ou égal à 10 %	La dose (DTC1-DTC3) x 100 / dose de DTC3.		- Taux d'abandon au DTC inférieur ou égal à 10%= 5 - Taux d'abandon au DTC supérieur à 10% = 0	**/ 5**	
15	Couverture vaccinale de BCG > ou égale à 80%.	Nombre de NC de l'aire de santé reçus / Nombre de NC de l'aire de santé attendus au cours de la période.	- Registre de vaccination -Formulaire 1 -Fiche de pointage -Rapport SNIS	Supérieure ou égale à 80% = 5 Inférieure à 80%.	**/5**	
16	Couverture vaccinale du Pentavalent ou DTC3 > ou égale à 80%.	Nombre de NC de l'aire de santé reçus / Nombre de NC de l'aire de santé attendus au cours de la période.	- Registre de vaccination Formulaire 1 Fiche de pointage Rapport SNIS CS	Supérieure ou égale à 80% = 5 Inférieure à 80% = 0	**/5**	
17	Couverture vaccinale de VAR > ou égale à 80%.	Nombre de NC de l'aire de santé reçus / Nombre de NC de l'aire de santé attendus au cours de la période.	- Registre de vaccination Formulaire 1 Fiche de pointage Rapport SNIS	Supérieure ou égale à 80% = 5 Inférieure à 80% = 0	**/5**	
18	Le pourcentage des enfants complètement vaccinés > ou égale à 80%.	Nombre d'ECV de l'aire de santé / Nombre d' ECV de l'aire de santé attendus au cours de la période.	- Registre de vaccination Formulaire 1 Fiche de pointage Rapport SNIS CS	> ou égal à 80% = 5 Inférieur à 80% = 0	**/5**	
19	Cohérence de données de la vaccination se trouvant dans les différents outils.	Les données qui sont enregistrées dans les différents documents sont concordantes entre elles et fiables.	Registre de vaccination Fiche de pointage Formulaire1 Rapport SNIS	La cohérence entre tous les documents = 5 La discordance des données dans l'un des outils = 0	**/5**	Les mêmes données doivent se retrouver dans les différents outils surtout que les activités ont eu lieu à la même date.
20	La couverture de femmes enceintes en VAT2+ est	Nombre de femmes enceintes de l'aire de santé couvertes en	Registre CPN Fiche de pointage	> ou égale à 80% = 5		Les nouveaux cas de l'aire de santé.

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
	supérieure ou égale à 80 %	VAT2+ / Nombre total de femmes enceintes de l'aire de santé attendues au cours de la période.		Inférieure à 80% = 0	/5	
21	Couverture de femmes enceintes en TPI2 supérieure ou égale à 80%.	Une femme enceinte n'est considérée couverte que lorsqu'elle a reçu le TPI2 à la 27ème semaine durant sa grossesse.	- Registre de CPN - Fiche de Consommation journalière de médicaments	Supérieure ou égale à 80% des femmes venues en CPN et qui ont reçu la 2e dose de SP à la 27e semaine = 5 Inférieure à 80% = 0	/5	Se rassurer aussi que le TPI n'est pas donné avant la 14e semaine ni après la 27e semaine sauf aux PVV chez qui on donne la 3e dose à la 32ème semaine.
22	Couverture de femmes enceintes en Fer-folate supérieure ou égale à 50%.	Nombre de femmes ayant reçu le Fer-folate/ Nombre de femmes enceintes de l'aire de santé venues à la CPN au cours de la période.	- Registre de CPN - Fiche de Consommation journalière de médicaments	> ou égale à 50% = 5 Inférieure à 50% = 0	/ 5	
23	Déparasitage de femmes enceintes au Mebendazole.	Nombre de femmes enceintes de l'aire de santé ayant reçu le Mebendazole / Nombre total de femmes enceintes de l'aire de santé venues à la CPN au cours de la période.	- Registre de CPN - Fiche de Consommation journalière de médicaments	> ou égale à 50% = 5 Inférieure à 50% = 0	/5	
24	Taux d'achèvement de la CPN est > ou égal à 60 %	Nbre de femmes enceintes de l'aire de santé vues et consultées au 8 – 9ème mois de la grossesse/ Nombre des femmes enceintes de l'aire de santé inscrites à la CPN	Registre de CPN	Si 60 % ou plus des femmes enceintes sont vues et consultées au 8 – 9ème mois = 4 Inférieur à 60% = 0	/4	
25	Taux d'accouchements assistés dans l'aire de santé pour la période évaluée supérieur ou égal à 80 %	Le taux d'accouchements assistés = Nombre d'accouchements assistés de l'aire de santé / Nombre d'accouchements prévus dans la période pour l'aire de santé X 100.	- Registre d'accouchement - Rapport SNIS CS	Si supérieur ou égal à 80 % = 4 Si inférieur à 80 % = 0	/4	Par accouchement assisté on sous-entend l'accouchement dirigé par un personnel qualifié.
26	Taux d'accouchement surveillés au CS pour la période évaluée >100%	Nombre d'accouchements surveillés/Nombre d'accouchements assistés	Partogramme complètement rempli	Si supérieur ou égal à 100%=5 Si inférieur à 100%=0	/5	Par accouchement surveillé on entend un accouchement pour lequel on a utilisé le partogramme
27	Taux de couverture en CPoN est supérieur ou égal à 50 %.	Nombre des accouchées de l'AS suivies / Nombre total des accouchées de l'AS.	-Registre de CPoN -Cahier de pointage	Si 50 % de femmes accouchées ou plus sont suivies = 3		Les femmes qui accouchent doivent être suivies par la stratégie « 666 », c'est-à-dire à la

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
				Si moins de 50 % = 0	/ 3	6e heure, au 6e jour et à la 6e semaine après l'accouchement.
28	Taux d'utilisation des services de Planning Familial dans les CS supérieur ou égal à 1%	Nombre des nouvelles acceptantes/proportion des femmes en âge de procréer (21%)	-Registre de PF -Fiche de consultation	Si supérieur ou égal à 1%=3 Si inférieur à 1%=0	/3	
29	Pas de rupture de stock pour les neuf médicaments traceurs au CS.	- La liste des médicaments traceurs est celle qui est recommandée par la DPS. Il s'agit de : Paracétamol ACT3+3, Amoxy 250mg cés, SRO, Zinc dispersable, Diazepam inj, SP, Cotrimoxazole 480mg, Mébendazole	- Fiches de stock (grand et petit stock) - Fiches de consommation journalière -RUMER -Fiches de réquisition	0 jour de rupture de stock de médicaments traceurs dans la période = 5 Dès qu'il y a rupture, c'est zéro.	/5	-En cas de pré rupture le BCZ s'engage à informer les partenaires et la hiérarchie. -S'il y a rupture à la pharmacie Zonale, le critère n'est pas appliqué mais si c'est au niveau du CS et qu'il y a des médicaments au BCZ, le critère est appliqué.
30	Concordance entre le stock physique et le stock théorique dans la Pharmacie du CS (grand stock et petit stock).	Choisir 10 médicaments au hasard dans la pharmacie du CS (grand stock et petit stock).	-- Fiches de stocks - Observation directe du stock physique -Fiches de réquisition.	10 fiches concordantes= 5 Moins de 10 fiches= 0.	/5	Les évaluateurs sont libres de choisir les Items à vérifier.
31	Stock de l'inventaire du mois précédent est égal au stock initial du mois suivant	Vérification de la concordance de ces deux stocks	-- Fiches de stocks - Observation directe du stock physique -Fiches de réquisition.	Si il ya égalité=5 Si il ya inégalité=0	/5	
32	Registres de grand et de petit stock sont à jour et bien tenus	- Toute sortie de médicaments doit être immédiatement consignée. - La quantité sortie doit correspondre à la quantité servie. Pas de rature ni surcharge dans ces registres.	-Les fiches de stock -Les cahiers ou fiches de réquisition	-Les documents à jour et bien tenus = 4 - Les documents ne remplissant pas une de conditions citées dans les activités = 0	/4	Eviter les ratures et surcharges dans les outils de gestion des médicaments.
33	Bon archivage au niveau de centre de santé	Un exemplaire de tous les rapports expédiés au BCZ doit être gardé au centre de santé dans une farde ou classeur Il s'agit des rapports ci-dessous : Formulaire 1 SNIS	Les classeurs ou les farde	80 % des archives de 3 derniers mois bien gardés = 5	/5	Les archives pour les trois derniers mois.

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
		MAPEPI Rapport financier Compte rendu du CODESA Compte rendu de la réunion du monitorage, Calendrier d'activités et rapport de supervisions de poste de santé Rapport de gestion de médicaments. Lettre administrative.		- Moins de 80 % = 0		
34	Taux de complétude des rapports périodiques et mensuels au BCZ et archivée au CS.	Les rapports périodiques concernent le rapport du PEV, le SNIS, le rapport de la réunion du CODESA, le rapport de la réunion du monitorage du CS, tous les rapports financiers y compris la justification de FF, ainsi que le rapport de gestion de médicaments.	- Copies envoyées au BCZ - Copies archivées au CS	100% de rapports remis = 3 Un seul rapport manquant = 0	**/3**	- Tous les rapports du CS doivent être envoyés au BCZ.
35	Taux de promptitude des rapports au BCZ et archivés au CS.	Les rapports périodiques concernent le rapport du PEV, le SNIS, le rapport de la réunion du CODESA, le rapport de la réunion du monitorage du CS, tous les rapports financiers y compris la justification de FF, ainsi que le rapport de gestion de médicaments.	- Copies envoyées au BCZ - Copies archivées au CS	100% de rapports remis à temps = 3 Un seul rapport remis en retard = 0	**/3**	- La période d'envoi des rapports est fixée au plus tard le 3 du mois prochain. - Pour le rapport MAPEPI, c'est chaque lundi.
36	Les données sanitaires (Soins curatifs, CPN, Accouchements, CPON, références et observations) se trouvant dans le SNIS sont concordantes avec celles contenues dans les registres y afférents.	Les données qui sont enregistrées dans les différents documents sont concordantes entre elles et fiables.	-Registres de consultations curatives -Registre de CPN -Registre d'accouchements -Registre de CPON -Registre de référence -Registre d'observations -SNIS	La cohérence de données entre tous les documents = 5 La discordance des données dans l'un des outils = 0	**/5**	
37	Disponibilité des outils de gestion de finances.	Concordance de tous les outils de gestion financière	-Compte d'exploitation -Livres de caisse analytique et ordinaire	Bonne tenue de tous ces outils = 3		Tous ces outils doivent être à jour, sans ratures ni surcharges et ne

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
			-Cahier de versements -Bons d'entrées et de sorties caisse -Carnet de bar ou carnet de reçu -Cahier de paie du personnel -Cahier de dettes et/ou de créances -Différentes factures d'articles achetés -Registres de réception et de consultations.	Mauvaise tenue d'un seul outil = 0	**/3**	contiendront ni omissions ni faussetés.
38	Respect de la clé de répartition de recettes locales du CS.	Pour ce qui est de la clé de répartition de recettes locales du Centre de santé, l'actuel Protocole d'accord prévoit ce qui suit : -60 % pour la pérennisation -30 % pour tous les agents du CS non primés par IRC. -10 % pour la Particom (à remettre au CODESA).	-Compte d'exploitation -Livres de caisse analytique et ordinaire -Etat de paie de tout le personnel -Bons de sortie caisse	Respect strict de la clé de répartition = 5 Non respect de la clé de répartition de recettes locales du CS = 0	**/ 5**	Tous les différents outils concernés dans pour cet indicateur doivent être conforme entre eux.
39	Absence de rupture de stock pour tous les antigènes.	Les antigènes concernés sont les vaccins : BCG, VAA, VAR, VAT, VPO et le Pentavalent.	- Fiche stock des vaccins - Cahier des réquisitions des antigènes.	0 jour de rupture de tous ces antigènes dans la période évaluée = 5 Un seul jour rupture = 0	**/5**	Tenir compte de la rupture qui est en amont du CS.
40	Suivi de la qualité des vaccins.	La fiche de relevé de température est complétée chaque jour (matin et soir).	-Thermomètre -Fiche de température -PCV -Congélation de DTC et VAT	Le remplissage journalier de la fiche avec une T° requise = 5 Le non remplissage de la fiche, Vaccins avec PCV virées, congélation de DTC et/ou de VAT, T° non requise = 0	**/5**	-La température requise varie de +2 à + 8 °C -DTC et VAT ne doivent jamais congeler -Ne pas utiliser les vaccins avec PCV aux stades III et IV
41	Bonne gestion du pétrole.	Approvisionnement journalier d'un litre de pétrole dans le réfrigérateur.	-Fiche de stock de pétrole. -Cahier de réquisition -Observation du stock physique.	Concordance entre la quantité sortie et celle effectivement utilisée dans le Réfrigérateur = 5		Eviter la rupture de stock de pétrole.

N°	CRITERES	DEFINITION	SOURCES DE VERIFICATION	COTATION	SCORE OBTENU	OBSERVATION
				La discordance entre la quantité sortie et celle effectivement utilisée dans le réfrigérateur = 0	**/5**	
42	Dépistage au VIH pour les femmes enceintes venues en CPN.	Nombre de femmes enceintes venues en CPN dépistées/ Nombre total de femmes enceintes venues en CPN.	-Registre CPN -Registre de labo	50% de femmes enceintes qui acceptent le dépistage= 5 Moins de 50% = 0	**/5**	
43	Implication des membres du CODESA dans le processus de gestion du CS	Participation de CODESA dans la réception des MEG et inventaire du patrimoine du CS	PV de réception des MEG avec signature du CODESA Présence de signature dans les PV d'inventaire	Absence de signature de CODESA dans le document=0 Présence de signature=5	**/5**	Toute falsification est interdite
44	Taux de référence supérieur ou égale à 5%	Nbre de malades référés durant la période / Nbre de NC reçu de l'aire de santé	Registre de référence Registre de réception Registre de consultation curative	Supérieur ou égale à 5 %= **5** Inférieur à 5% = 0	**/5**	Les malades référés doivent se retrouver aussi dans le registre de reception, consultation curative et de référence
SCORE : / soit %						

Toute fausse information rapportée prouvée entraine une pénalité de 25% du score obtenu.

Fait à, le / / 20….

<u>Les personnes présentes à l'évaluation</u>: **<u>L'équipe d'évaluateurs:</u>**

Appendix 2: Final Health worker survey

Interview Start Time: Hour |___|___| Minute |___|___|

SECTION 1: PROVIDER INFORMATION, TRAINING, POSITION AND EXPERIENCE			
101	What is your age? (record age in years)	|___|___| Years	
102	What is your marital status?	Married ……..…1 Single……..…2 Widowed……...3 Separated……..4 Other……96	
103	Sex of the healthcare provider	Male ….....1 Female ….....2	
104	What is your position in the health facility?	Head of the facility……..…...1 Physician ….……2 Nurse……..3 Midwife……...4 Trained birth attendant……5 Community health worker (L2 or G3)……6 Other……..96 _____ (Specify)	
105	What is your educational qualification (highest degree or certificate earned)?	General Physician……....1 Medical Specialist (please specify)……....2 Nurse A0/L2……...3 Nurse A1…….....4 Nurse A2 …….....5 Nurse A3……...6 Midwife A0/L2 ……..……....7 Midwife A1…….....8 Midwife A2 ……..…...9 Midwife A3……..…...10 Trained birth attendant……..…....11 Community health worker L2……....12 Community health worker G3 ……...13 Postgraduate degree……...14 None……..15 Other……..…96 _____ (Specify)	
106	How many years have you worked in this current position since your final degree/graduation?	Years.....|___|___|	
107	How many years have you worked at this facility?	Years.....|___|___|	
108	Is this facility located in your home district or not?	Yes……1 No……..2	
109	Do you live away from your family due to work reasons?	Yes……1 No……..2 Not applicable …… 8	
110	How many dependents are you financially responsible for?	Number……..|___|___|	

SECTION 2: SERVICES PROVIDED					
Which of the following services have you provided within the past 3 months? ***READ EACH SERVICE AND CIRCLE"1" (YES) IF*** *THE RESPONDENT HAS PROVIDED AT LEAST ONCE WITHIN THE PAST THREE MONTHS.* ***OTHERWISE, CIRCLE "2"****.*		Yes	No	Do you spend more than 6 hours a week on the average on this?	
				Yes	No
201	Supervise Community Health Workers	1→	2--↓	1	2
202	Consultation for children	1→	2--↓	1	2
203	Consultation for adults	1→	2--↓	1	2
204	Family planning (temporary and permanent methods)	1→	2--↓	1	2
205	Antennal Care (ANC)	1→	2--↓	1	2
206	Postnatal Care (PNC)	1→	2--↓	1	2
207	Major Surgery	1→	2--↓	1	2
208	Minor Surgery	1→	2--↓	1	2
209	Inpatient care/services	1→	2--↓	1	2
210	Deliveries in a facility	1→	2--↓	1	2
211	Home deliveries	1→	2--↓	1	2
212	Tuberculosis treatment/diagnosis	1→	2--↓	1	2
213	Vaccinations	1→	2--↓	1	2
214	Malaria treatment	1→	2--↓	1	2
215	Nutrition (growth monitoring, nutrition counseling, etc)	1→	2--↓	1	2
216	Other outreach services	1→	2--↓	1	2
217	Community Health Worker training	1→	2--↓	1	2
218	Any others? _____ (Specify)	1→	2--↓ 220	1	2
219	Any others? _____ (Specify)	1→	2--↓ 220	1	2

No	Questions	Response	
220	How many hours do you work in this health facility in a normal week?	Hours..... ..... |___|___|	
221	How many hours are you *paid* to work in this facility in a normal week?	Hours..... ..... |___|___| Don't know……8	
SUPERVISION OF SERVICE PROVISION			
222	Do you have a supervisor WITHIN the facility?	Yes……1 No……..2	➔226

223	Who is your supervisor WITHIN the facility?	Head of the facility……..1 Medical specialist (please specify)……..2 Physician (general) …. . ……3 Nurse A0/L2 ……..4 Nurse A1……..5 Nurse A2……..6 Nurse A3……..7 Midwife A0/L2 ……..8 Midwife A1…. .……9 Midwife A2 ……..10 Midwife A3……..12 Trained birth attendant……11 Community health worker L2 ……..13 Community health worker G3……..14 Other……96 _____ (Specify)	
224	When was the most recent time that a supervisor from WITHIN the facility interacted with you in a supervisory capacity? *DO NOT READ CHOICES, BUT CIRCLE THE APPROPRIATE NUMBER FOR THE RESPONSE GIVEN*	During the current month ……1 Within the past one month.. ……..2 Within the past 1-3 months. ……..3 Within the past 3-6 months. ……..4 More than 6 months ..... ……..5 Never..... ……..6	➔226
225	What did the supervisor do? *DO NOT READ CHOICES; CIRCLE THE* ***ANSWER(S) GIVEN, OR WRITE IN IF "OTHER".*** *IF MORE THAN ONE ANSWER IS GIVEN, CIRCLE ALL THAT APPLY.*	Checked records ..... 1 Checked finances..... 2 Observed consultation..... 3 Asked knowledge questions..... 4 Provided health instruction ..... 5 Provided administrative instruction..... 6 Provided instruction in filling HMIS ..... 7 Nothing ..... 8 Other……96 _____ (Specify)	
226	Do you have a supervisor OUTSIDE the facility?	Yes……1 No……..2	➔231
227	Who is/are your main supervisor(s) OUTSIDE the facility?	Médecin Chef de Zone……1 Health Zone Management team……2 NGO workers……3 Faith based Organisation representatives……4 Other (please specify)……5 _____ (Specify)	
228	When was the most recent time that a supervisor from OUTSIDE the facility interacted with you face to face?	Within current month ……1 Within the past one month.. ……..2 Within the past 1-3 months. ……..3 Within the past 3-6 months. ……..4 More than 6 months ..... ……..5 Never..... ……..6	➔230

229	What did the supervisor do when he/she came? *DO NOT READ CHOICES; CIRCLE THE* ***ANSWER(S) GIVEN, OR WRITE IN IF "OTHER".*** *IF MORE THAN ONE ANSWER IS GIVEN, CIRCLE ALL THAT APPLY.*	Brought supplies.....1 Checked records .....2 Checked finances.....3 Observed consultation.....4 Asked knowledge questions.....5 Provided health instruction .....6 Provided administrative instruction.....7 Provided instruction in filling HMIS.....8 Nothing.....9 Other……..96 _____ (Specify)	
230	When was the most recent time that a supervisor from OUTSIDE the facility interacted with you through other means e.g. telephone/official communications?	Within the current month ……1 Within the past one month..……2 Within the past 1-3 months.……3 Within the past 3-6 months.……4 More than 6 months .....……5 Never.....……6	
231	What are the three biggest difficulties that you face in doing your job in the facility? How would you rank these in terms of the biggest, second biggest and third biggest difficulties? *DO NOT READ CHOICES; CIRCLE THE ANSWER(S) GIVEN, OR WRITE IN IF* ***"OTHER".*** *CIRCLE ONLY THREE CHOICES.* ☐☐ ☐☐ ☐☐ 1st biggest 2nd biggest 3rd biggest	Lack of trained personnel/staff…..... …1 Lack of knowledge…..…….. ..... …2 Lack of feedback of performance……..3 Patients come to clinic too late…. ..... …4 Inadequate transport…….……. ..... …5 Lack of time…. .....……. ..... …6 Lack of motivation…..…….. ..... …7 Staff shortages…….……. ..... …8 Poor working environment…. ..... …9 Lack of supplies and drugs…. ..... …10 Lack of equipment…….……. ..... …11 Irregular/no water supply…. ……. ..... …12 Irregular/no electricity…….……. ..... …13 No laboratory or poor lab quality …..... …14 Lack of space in the facility…..... …15 Lack of supervision…. .....……. ..... …16 Inadequate furniture .....…….....……17 No problem..... .....95 Other……96 _____ (Specify)	➔301
232	Have you discussed the problems with your supervisor(s) (either within or outside the facility) within the last year? IF RESPONDENT HAS NO INTERNAL OR EXTERNAL SUPERVISORS, CIRCLE NOT APPLICABLE	Yes .....1 No.....2 Not applicable……..8	➔301 ➔301
233	After these discussions did you notice any improvements in the problems?	Yes .....1 No.....2	

SECTION 3: HEALTHCARE PROVIDER SATISFACTION

In this part of the questionnaire we would like to ask you some questions regarding your satisfaction with your current job. All answers are confidential and any identifying information will be removed.

I'm now going to read you a series of statements about your *level of satisfaction*. Please indicate whether you are very satisfied, satisfied, dissatisfied, or very dissatisfied. If you are *neither satisfied nor dissatisfied* then say neutral.

READ FROM THE LIST BELOW AND ASK WHICH CATEGORY APPLIES (1-5).

No.	How would you rate the following aspects of your work?	1 Very Satisfied	2 Satisfied	3 Neutral	4 Dissatisfied	5 Very Dissatisfied
301	Working relationships with upper-level staff	1	2	3	4	5
302	Working relationship with colleagues	1	2	3	4	5
303	Management of the health facility - by the Ministry of Public Health or by the relevant management office	1	2	3	4	5
304	Transparency of the management of financial resources by the facility	1	2	3	4	5
305	Your participation in decision-making to resolve problems in the facility	1	2	3	4	5
306	The number of staff working in the facility	1	2	3	4	5
307	The description of your job role and tasks	1	2	3	4	5
308	Relationships with local leaders in the community	1	2	3	4	5
309	The stability of your job/contract	1	2	3	4	5
310	Availability of medicines in the health facility	1	2	3	4	5
311	Availability of equipment in the health facility	1	2	3	4	5
312	Availability of medical supplies in the health facility	1	2	3	4	5
313	The physical condition of the health facility building	1	2	3	4	5
314	Your ability to provide a high quality of care to patients	1	2	3	4	5
315	Your level of responsibility	1	2	3	4	5
316	The level of respect from your supervisors within the facility	1	2	3	4	5
317	The level of respect from your supervisors outside the facility	1	2	3	4	5
318	Your respect in the community	1	2	3	4	5
319	Your training opportunities to upgrade your skills and knowledge	1	2	3	4	5

320	Your ability to use skills learned from training in your work	1	2	3	4	5
321	Your ability to meet the needs of the community	1	2	3	4	5
322	Your salary in relation to your workload	1	2	3	4	5
323	Your salary in relation to your competence/skills	1	2	3	4	5
324	Employment benefits (travel allowance, bonus, health care etc.)	1	2	3	4	5
325	Flexibility with attendance and work hours	1	2	3	4	5
326	Your workload	1	2	3	4	5
327	The division of work between you and your colleagues	1	2	3	4	5
328	The division of work between caring for patients and other tasks	1	2	3	4	5
329	The support from other colleagues in your team	1	2	3	4	5
330	How you and other colleagues are selected to attend training	1	2	3	4	5
331	The variety of your tasks	1	2	3	4	5
332	Safety and security to live and practice in the community	1	2	3	4	5
333	Living accommodations for your family	1	2	3	4	5
334	Education for your children	1	2	3	4	5
335	Recognition of your good work by your boss	1	2	3	4	5
336	Your opportunities for promotion	1	2	3	4	5
337	The system by which staff are rewarded	1	2	3	4	5
338	Overall, your satisfaction with your job	1	2	3	4	5
339	Which three of the aspects mentioned above, in your opinion, are most important in affecting your job satisfaction? (WRITE THE QUESTION NUMBERS)	(A) Most important		(B) 2nd most important	(C) 3rd most important	

SECTION 4: MOTIVATION OF HEALTHCARE PROVIDER

Please tell me whether you strongly agree, agree, disagree or strongly disagree with the following statements. If you neither agree nor disagree say "neutral." READ *FROM THE LIST BELOW AND ASK WHICH CATEGORY APPLIES (1-5)*

No	*QUESTION*	1 Strongly agree	2 Agree	3 Neutral	4 Disagree	5 Strongly disagree
PRIDE						
401	*This health facility has a good reputation in the community*	1	2	3	4	5
402	*It is a source of pride to get a job at this facility*	1	2	3	4	5
403	*I am satisfied that I accomplish something worthwhile in this job*	1	2	3	4	5
404	*Healthcare providers at this health facility pride themselves on providing good services to patients*	1	2	3	4	5
FINANCIAL REWARD						
405	*The effort that we at this facility put into this job is reflected in our pay*	1	2	3	4	5
406	*My job offers adequate pay compared with similar jobs*	1	2	3	4	5
407	*The income I receive is a fair reflection of my skills, knowledge and training*	1	2	3	4	5
408	*The income that I receive from working at this facility more than covers my basic needs such as food, transport, and accommodation*	1	2	3	4	5
409	*With this job I have worries about how to support myself and my family*	1	2	3	4	5
PERCEIVED SELF-EFFICACY						
410	*I am confident about my ability to handle my work*	1	2	3	4	5
411	*I effectively cope with any new challenges that occur in my work life*	1	2	3	4	5
412	*I feel that at work things are going the way I would like them to*	1	2	3	4	5
413	*I feel that I have control of things concerning my work*	1	2	3	4	5

414	*I have received sufficient training to be able to perform my job well*	1	2	3	4	5
COMMITMENT						
415	*I only do this job so that I get paid at the end of the month*	1	2	3	4	5
416	*I intend to leave this facility as soon as I can find another position*	1	2	3	4	5
417	*I would recommend this profession to my children*	1	2	3	4	5
SELF-PERCEIVED CONSCIENTIOUSNESS						
418	*I am always reliable and dependable at work*	1	2	3	4	5
419	*My work is consistently of a high quality*	1	2	3	4	5
420	*I am a hard worker*	1	2	3	4	5
421	*I am always on time at work*	1	2	3	4	5
422	*I spend my time at work on work-related activities*	1	2	3	4	5
423	*I am rarely absent from work*	1	2	3	4	5
424	*I am careful not to make errors at work*	1	2	3	4	5
425	*When I am not sure how to treat a patient's condition I look for information or ask for advice*	1	2	3	4	5
426	*I do things which need to be done without being asked or told*	1	2	3	4	5

SECTION 5: PROVIDER INCOME

Now we would like to ask you some questions about your income, both from this job and any other sources of income you may have. These questions help us understand how adequate your salary is, and strategies you use to make a living

No.	Question		
501	Who is/are your main employer(s)? *DO NOT READ CHOICES; CIRCLE THE ANSWER(S) GIVEN, OR WRITE IN IF* ***"OTHER". IF MORE THAN ONE*** *ANSWER IS GIVEN, CIRCLE ALL THAT APPLY.*	Government……1 Patient……..2 NGO……3 Donor……4 FBO (faith based organization)……5 Private organization……6 Other (please specify)……96 _____ (Specify)	
502	What is the total monthly net salary *you are supposed to receive* from your employment at this facility (after deduction and taxes etc.)?	|___|___|___|___|___| ___| Congolese francs Don't know……8	
503	What salary did *you actually receive* from your employment at this facility last month (after deduction and taxes etc.)?	|___|___|___|___|___| ___| Congolese francs	
504	Is the payment of your salary up to date?	Yes ..... 1 No……2	➔506
505	How many months behind is it?	Months ....|___|___| Don't know……..8	
506	Do you receive a monthly hazard pay?	Yes ..... 1 No..... 2	➔512
507	What is the amount of hazard pay you *are supposed to* receive monthly?	|___|___|___|___|___| ___| Congolese francs Don't know……8	
508	What amount of monthly hazard pay did you *actually* receive last month?	|___|___|___|___|___| ___| Congolese francs	
509	Is the payment of your hazard pay up to date?	Yes ..... 1 No..... 2	➔511
510	How many months behind is it?	Months ....|___|___| Don't know……..8	
511	What is the source of your monthly hazard pay?	Government……...1 NGO……2 Donor……..3 Private organization……4 FBO (faith based organization)……..5 Health facility income……...6 Don't know……7 Other (please specify)……...96 _____ (Specify)	

512	Do you receive a monthly performance bonus?	Yes ..... 1 No 2	➔517
513	Are you aware of any performance criteria attached to this bonus?	Yes ..... 1 No 2	
514	What is the amount of monthly performance bonus you are supposed to receive?	|___|___|___|___|___| ___| Congolese francs Don't know……8	
515	What amount of performance bonus did you *actually* receive last month?	|___|___|___|___|___| ___| Congolese francs	
516	What is the source of your monthly performance bonus?	Government……...1 NGO……2 Donor……..3 Private organization……4 FBO (faith based organization)……..5 Health facility income……...6 Don't know……7 Other (please specify)……...96 _____ (Specify)	
517	Do you receive any monthly income from user fees collected at the facility?	Yes ..... …..1 No……..2 Don't know……3	➔519 ➔519
518	What is the amount of monthly user fees you *actually* received last month?	|___|___|___|___|___| ___| Congolese francs	
519	Do you get housing through your work?	Yes ..... 1 No 2	➔521
520	If you get housing through your work, what should be the fair rental value of the housing?	|___|___|___|___|___| ___| Congolese francs Don't know……8	
521	Do you receive any of the other following allowances through your work? READ EACH POSSIBLE RESPONSE TO THE RESPONDENT. CIRCLE ONLY THOSE FOR WHICH THE RESPONDENT ANSWERED **"YES".** MULTIPLE RESPONSES ALLOWED	Rural allowance……...1 Transport allowance……...2 Medical allowance……..3 Overtime allowance…….....4 Uniform allowance……..5 Non practice allowance…….....6 None……7 Other (please specify)……...96 _____ (Specify)	➔523
522	FOR EACH RESPONSE CIRCLED IN QUESTION 521, POSE THE QUESTION: How MUCH do you receive for (STATE APPROPRIATE CATEGORY)?	Rural allowance |___|___|___|___|___| Transport allowance |___|___|___|___|___| Medical allowance |___|___|___|___|___| Overtime allowance |___|___|___|___|___| Uniform allowance |___|___|___|___|___| Non practice allowance |___|___|___|___|___| Other (please specify) |___|___|___|___|___| _____	

	IF UNKNOWN WRITE 99999.	(Specify)	
523	Do you receive any per diems (e.g. for workshops, training or other travel)?	Yes .....1 No……..2 Don't know……...3	 ➔525 ➔525
524	If yes, how much do you receive in per diems for training on average in a year?	|___|___|___|___|___| ___| Congolese francs	
525	Did you receive additional income from patients over the past year, either as direct payment for services or as a gift?	Yes .....1 No……..2 Don't know……...3	 ➔527 ➔527
526	If yes, please state the amount you received from your patients in the previous month	|___|___|___|___|___| ___| Congolese francs	
527	Do you supplement your main income with extra private health care work?	Yes .....1 No……..2 Don't know……...3	 ➔530 ➔530
528	If yes, which of these options best describes where this private practice is located?	Same building as main job……1 At home……..2 At home of a colleague……..3 In rented premises……..4 At patient/client's home……...5 Private facility……...6 NGO facility……7 Other (please specify)……96 _____ (Specify)	
529	How much did you get paid for this private practice last month?	|___|___|___|___|___| ___| Congolese francs	
530	Do you have any additional sources of income?	Yes ..... 1 No..... 2	 ➔End
531	Can you tell me which of the additional sources of income you have?	Agriculture ..... 1 Trade/Business..... 2 House rent..... 3 Other……96 _____ (Specify)	
532	If yes to one or more of any of the above, what is the amount for each in the last month? IF UNKNOWN WRITE 99999.	Agriculture |___|___|___|___|___| Trade/Business |___|___|___|___|___| House rent |___|___|___|___|___| Other (specified above).|___|___|___|___|___| Don't want to say……8	
Thank you for your time			

Interview End Time: Hour |___|___| Minute |___|___|

Appendix 3: Final Health facility survey (overleaf)

Appendix 3: Final Health facility survey

Interview Start Time: Hour |__|__| Minute |__|__|

SECTION 1. BASIC FACILITY INFORMATION			
First I would like to ask you some general questions about how this facility is organized, and what infrastructure and resources are available.			
No.	**QUESTION**	**RESPONSE**	**SKIP/ INSTRUCTIONS**
1.	How far is the village from the facility?	DISTANCE IN KM |__|__|__| DON'T KNOW……999	
2.	For how many years has this facility been in operation?	NUMBER OF YEARS |__|__| DON'T KNOW……99	
3.	How many days each week is the facility routinely open for outpatient curative services?	NUMBER OF DAYS |__| DON'T KNOW……9	
4.	Is there a trained health provider assigned to and present at the facility at all times (24 hours a day) for emergencies? IF YES, ASK: Is there a duty schedule for 24-hour staff coverage? IF YES, ASK TO SEE THIS.	YES, DUTY SCHEDULE OBSERVED……..01 YES, NOT OBSERVED ……..02 NO 24-HOUR ON SITE STAFF……..03	➔ **GO TO 6** ➔ **GO TO 6**
5.	Is there a trained health provider available away from the facility but officially on call, at all times, (24 hours a day) for emergencies? IF YES, ASK: Is there a duty schedule for 24-hour staff coverage? IF YES, ASK TO SEE THIS.	YES, SCHEDULE/NOTICE OBSERVED……..01 YES, SCHEDULE/NOTICE NOT SEEN……..02 NO 24 HOUR ON CALL STAFF……..03	
6.	How far is the closest referral/orientation center from this facility?	KILOMETERS |__|__|__| DON'T KNOW……999	
7	How far is the facility to which the patients seen at this facility are referred most often?	KILOMETERS |__|__|__| DON'T KNOW……999	

8.	What type of facility is this?	**PUBLIC MEDICAL SECTOR** HGR……..…..01 SECONDARY HOSPITAL……..…02 REFERENCE HEALTH CENTER…….…….03 HEALTH CENTER……..…..04 HEALTH POST……..05 MATERNITY……..…….06 OTHER PUBLIC SECTOR …….07 **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC…..08 UNIVERSITY CLINIC……09 SPECILITY CLINIC……..…..10 PRIVATE MEDICAL PRACTICE……..11 OTHER PRIVATE SECTOR……..12 DON'T KNOW……99 OTHER ……96 _____ (SPECIFY)	

SECTION 2. SERVICES OFFERED BY HEALTH FACILITY

SERVICE		Is [SERVICE] offered at this health facility? 1=YES ➔ 2=NO **(🡻NEXT SERVICE)**	WHERE APPLICABLE, POSE THE QUESTION IN THE COLUMN. IF NOT APPLICABLE, TO GO QUESTION c.	Do patients have to pay for [SERVICE]? 1=YES ➔ 2=NO **(NEXT SERVICE)**	How much are patients charged for (SERVICE)?
		a.	**b**	**c.**	**d.**
9.	General outpatient	1 ➔ 2 **(🡻NEXT SERVICE)**	How many observation beds are there in this facility? NUMBER OF OBSERVATION BEDS ____ NONE……98 DON'T	**(🡻 NEXT SERVICE)**	
10.	Immunization for children	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
11.	Antenatal care	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
12.	Normal deliveries	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
13.	Deliveries by caesarian section	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
14.	Postnatal care	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
15.	Family planning	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
16.	Tuberculosis treatment	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
17.	STIs treatment	1 ➔ 2 **(🡻NEXT SERVICE)**	➔ c	1 ➔ 2 **(🡻 NEXT SERVICE)**	_____/_____/_____/ *Congolese Francs*
18.	Community and outreach Services	1 ➔ 2 **(🡻NEXT SERVICE)**	**(🡻 NEXT SERVICE)**		

19.	Dental services	1 ➔ 2 **(🡻NEXT SERVICE)**	**(🡻 NEXT SERVICE)**		
20.	General inpatient-medical services	1 ➔ 2 **(🡻NEXT SERVICE)**	How many routine inpatient beds are there in this facility? NUMBER OF ROUTINE INPATIENT BEDS |__|__|__| NONE…….. 998 DON'T	**(🡻 NEXT SERVICE)**	
21.	General inpatient-surgical service	1 ➔ 2 **(🡻NEXT SERVICE)**	How many surgical beds are there in this facility? NUMBER OF SURGICAL BEDS |__|__|__| NONE……..	**(🡻 NEXT SERVICE)**	

SECTION 3. GENERAL STAFFING

Now I have some questions about staffing for this facility. Please tell me how many staff members with each qualification are currently assigned to this facility and whether they are male or female staff, and whether they are present today.

	Qualification	Number Male a.	Number Female	Staffing Unknown c.	Number present today d.
22.	Medical Doctor (specialist)	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
23.	Medical Doctor (General practitioner)	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
24.	Registered Nurse (L2)	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
25.	Nurse A1	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
26.	Nurse A2	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
27.	Nurse A3	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
28.	Anesthetist	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
29.	Midwife or trained birth attendant (A1)	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|
30.	Community health worker (L2 OR G3)	|__|__|__|__|	|__|__|__|__|	|__|	|__|__|__|__|

31.	Pharmacist	____	____	__	____
32.	Pharmacy dispenser	____	____	__	____
33.	Laboratory Technician/technologist A1	____	____	__	____
34.	Radiology Technician	____	____	__	____
35.	Nutritionist	____	____	__	____
36.	Records Clerk	____	____	__	____
37.	Hospital Administrator	____	____	__	____
38.	Maintenance technician	____	____	__	____
39.	Receptionist	____	____	__	____
40.	All other staff with clinical training or providing client services _____ (SPECIFY)	____	____	__	____
41.	**SUM THE NUMBER OF STAFF REPORTED IN EACH COLUMN**	____	____	__	____

SECTION 4. BASIC INFRASTRUCTURE				
No.	**Questions and filters**	**YES**	**NO**	**SKIP**
42.	Is there a reception/registration rooms or space?	1	2	
43.	Is there a consultation/examination room for outpatients?	1	2	If NO GO TO ➔**48**
44.	Does the examination room have an examination bed?	1	2	
45.	Does the examination room have an instrument trolley?	1	2	
46.	Does the examination room have a hand-washing facility?	1	2	
47.	Does the examination room have a spot light?	1	2	
48.	Is there a separate treatment room?	1	2	
49.	Is there a separate room for observation?	1	2	
50.	Is there an emergency room?	1	2	
51.	Is there an operation theater?	1	2	
52.	Is there a separate medicine dispensing room?	1	2	
53.	Does this facility have a maternity ward?	1	2	If NO GO TO➔**56**
54.	How many beds are in the maternity ward?	____ NONE……998 DON'T KNOW……999		
55.	Does the facility have a maternity-waiting house?	1	2	
56.	Does the facility have cell phone reception?	1	2	

57.	Does the facility have a radio?	1	2	
58.	Does the facility have internet?	1	2	
59.	Does the facility have electricity?	1	2	If NO GO TO ➔**62**
60.	Is electricity functioning now? (**CHECK TO SEE IF ELECTRICITY CAN BE TURNED ON).**	1	2	
61.	Is the electricity, not including any backup generator, ever interrupted during the times when the facility is providing services?	1	2	
62.	Is there a functional solar panel?	1	2	If NO GO TO ➔**63**
63.	Is there a functional battery for solar panel?	1	2	
64.	Does this facility have a generator for electricity? This may be a back-up or stand-by generator.	1	2	If NO GO TO ➔**66**
65.	Is the generator functional and is there fuel today? ACCEPT REPORTED RESPONSE FROM KNOWLEDGEABLE RESPONDENT.	1	2	

66.	What is the main source of water at this facility?	PIPED WATER FROM CENTRAL SUPPLY……..01 SUPPLY TRUCK……..02 RAINWATER COLLECTION.....03 STANDPIPE……..04 LOCAL RIVER/LAKE……05 OTHER……06 _____ (SPECIFY) DON'T KNOW……99	
67.	Is there potable water, that is to say safe drinking water, in the structure?	YES……..01 NO……02 DON'T KNOW……99	
68.	Is there a sanitary toilet or latrine that is available for clients to use, such as those with sewer connections, septic system connections, pour-flush latrines, ventilated improved pit latrines and pit latrines with a slab or covered pit?	YES……..01 NO……02 DON'T KNOW……99	} **GO TO 70**
69.	Is there a separate sanitary toilet/latrine for the use of women patients?	YES……..01 NO……02 DON'T KNOW……99	

70.	Please tell me the most common means of transport used by patients to travel to this facility.	PRIVATE CAR OR MOTORCYCLE……..01 PUBLIC TRANSPORTATION……02 AMBULANCE……03 BICYCLE……04 WALKING……05 CANOE……06 MOTORIZED BOAT……07 OTHER ……08 _____ (SPECIFY) DON'T KNOW……99	
71.	Does this facility have a functional ambulance or other vehicle for emergency transportation for clients? **ACCEPT REPORTED RESPONSE.**	YES……01 NO……02 DON'T KNOW……99	

SECTION 5. FACILITY VOLUME			
ASK THE FACILITY IN-CHARGE FOR THE RECORDS/DATA TRANSMISSION FOR THE <u>LAST COMPLETED MONTH</u>. COLLECT INFORMATION ONLY FOR <u>THE LAST COMPLETED MONTH</u>; DO NOT COLLECT DATA ON THE CURRENT MONTH		WRITE IN THE TOTAL NUMBER OF PERSONS OR PATIENTS IN THE APPROPRIATE COLUMN, BASED ON WHETHER THE NUMBER COMES FROM THE FACILITY'S RECORDS **OR** FROM ESTIMATES MADE BY THE IN-CHARGE. IF NOT KNOWN, WRITE 9999 IN THE FIRST COLUMN.	
		From records a.	**Estimated b.**
72.	Population of catchment area.	|__|__|__|__|__|__|__|	|__|__|__|__|__|__|__|
73.	Number of outpatients seen during the last completed month (***1* month**).	|__|__|__|__|	|__|__|__|__|
74.	Number of female outpatients seen during the last completed month (***1* month**).	|__|__|__|__|	|__|__|__|__|
75.	Number of under 5 patients seen at outpatient during the last completed month (***1* month**).	|__|__|__|__|	|__|__|__|__|
76.	ASK THE QUESTION **<u>ONLY</u>** IF THE RESPONDENT ANSWERED "YES" TO **<u>QUESTION 12:</u>** Number of normal deliveries in the facility during the last completed month (**1 month**).	|__|__|__|	|__|__|__|
77.	ASK THE QUESTION **<u>ONLY</u>** IF THE RESPONDENT ANSWERED "YES" TO **<u>QUESTION 13:</u>** Number of cesarean sections in the facility during the last completed month (**1 month**).	|__|__|__|	|__|__|__|

SECTION 6. BASIC DRUGS AND SUPPLIES

	I would like to ask you some questions regarding the facilities drug supply. I am going to read you a list of drugs. For each one, please tell me if the drug is currently in stock and if the drug has been out of stock at any point in the past month	**Is this drug currently in stock?** **YES…..1** **NO……2** **a.**		**Has this drug been out of stock at any point in the past month?** **YES…..1** **NO….2** **DON'T KNOW….3** **b.**		
Basic drugs						
78.	Halothane or Ketamine	1	2	1	2	3
79.	Atropine	1	2	1	2	3
	Local anesthetics					
80.	Lidocaine or Bupvicaine	1	2	1	2	3
	Analgesics, Antipyretics					
81.	acetylsalicylic acid	1	2	1	2	3
82.	Ibuprofene or paracetamol	1	2	1	2	3
	Anti-Allergy					
83.	Hydrocortisone or Dexamethasone	1	2	1	2	3
	Anticonvulsants					
84.	Diazepan	1	2	1	2	3
	Intestinal anthelmintics					
85.	Mebendazole or albendazole	1	2	1	2	3
	Antibacterial					
86.	Amoxicilline	1	2	1	2	3
87.	Ampicilline	1	2	1	2	3
88.	Ciprofloxacine	1	2	1	2	3
89.	Cotrimoxazole	1	2	1	2	3
	TB					
90.	Isoniazide + rifampicine	1	2	1	2	3
91.	Éthambutol + isoniazide	1	2	1	2	3
92.	Streptomycine	1	2	1	2	3
93.	Rifampicine + Isoniazide + éthambutol	1	2	1	2	3
	Antiamoebic					
94.	Métronidazole	1	2	1	2	3
	Antimalarial					
95.	Sulfadoxine-pyrimethamine (SP)	1	2	1	2	3
96.	Quinine	1	2	1	2	3
97.	Artéméther + luméfantrine	1	2	1	2	3
98.	Artésunate + Amodiaquine	1	2	1	2	3
	Viral					
99.	PEP kit / emergency kit	1	2	1	2	3
	Antianemic					
100.	Acide folique	1	2	1	2	3
101.	Iron syrup or iron dextran	1	2	1	2	3
	A**ntiangoreux**					
102.	Nitroglycérine	1	2	1	2	3
	hypotensive					
103.	Aténolol	1	2	1	2	3
	Heart attack/failure					
104.	Digoxine	1	2	1	2	3
105.	Épinéphrine	1	2	1	2	3
	Diuretics					
106.	Fursémide	1	2	1	2	3

	Antidiabetic					
107.	Insuline	1	2	1	2	3
108.	Metformine	1	2	1	2	3
	Trouble Hydro-électrolutiques					
109.	ORS	1	2	1	2	3
	Oxytocics					
110.	Oxytocine	1	2	1	2	3
	Family Planning					
111.	Condoms	1	2	1	2	3
112.	Oral contraceptives	1	2	1	2	3
113.	IUD	1	2	1	2	3
	Antiseptics and disinfectants					
114.	Alcool dénaturé 70°	1	2	1	2	3
115.	Alcool iodé 2%	1	2	1	2	3
	Other					
116.	Wound stitching material	1	2	1	2	3

SECTION 7. EQUIPMENT

Now I would like to ask you some questions about the facilities equipment. I will read you a list of equipment and for each piece please tell me how many the facility has and the number functional.

	Large Medical Supplies	**How many? a**	**Number functional? B**
117.	X-ray	|__|__|	|__|__|
118.	Ultrasound	|__|__|	|__|__|
119.	Microscope	|__|__|	|__|__|
120.	Sterilizer	|__|__|	|__|__|
121.	Centrifuge	|__|__|	|__|__|
	Equipment for Newborns		
122.	Table to care for newborn	|__|__|	|__|__|
123.	Scale for baby weighing	|__|__|	|__|__|
	Other Materials		
124.	Weighing scale for adults	|__|__|	|__|__|
125.	Height measure for children	|__|__|	|__|__|
126.	Height measure for adults	|__|__|	|__|__|
127.	Delivery kit	|__|__|	|__|__|
128.	Episiotomy Kit	|__|__|	|__|__|
129.	Simple Stretcher	|__|__|	|__|__|
130.	Instrument cart	|__|__|	|__|__|
131.	IV Stand	|__|__|	|__|__|
132.	Delivery table with stirrups	|__|__|	|__|__|
133.	Examination table	|__|__|	|__|__|
134.	Gynecological table	|__|__|	|__|__|
135.	Blood pressure monitor	|__|__|	|__|__|
136.	Stethoscope	|__|__|	|__|__|
137.	Thermometer	|__|__|	|__|__|
138.	Timer (clock with second hand)	|__|__|	|__|__|
	Family Planning Kits		
139.	Insertion/withdrawal of IUD	|__|__|	|__|__|
140.	Insertion/withdrawal of Implants	|__|__|	|__|__|
	Individual Protection Equipment		
141.	Gowns	|__|__|	|__|__|
142.	Mask	|__|__|	|__|__|
143.	Sterilized gloves	|__|__|	|__|__|
	Cold Chain		

144.	Refrigerator	|__|__|	|__|__|
145.	Working Thermometer	|__|__|	|__|__|
	Transportation Equipment (in working condition)		
146.	Motorcycle	|__|__|	|__|__|
147.	Bicycles	|__|__|	|__|__|
148.	Canoe/boat	|__|__|	|__|__|
149.	Ambulance/car/truck	|__|__|	|__|__|

SECTION 8. LABORATORY

150.	Does this facility have a laboratory?	YES……01 NO……02	**➔GO TO 165**	
151.	Does the facility perform diagnostic tests?	YES……01 NO……02	**➔GO TO 165**	
	I am going to read you a list of laboratory test. Please indicate whether the facility is able to do this test today, was able to do this test in the past 6 months but not today, or if the facility cannot do this test.	**Able to do this test today** **a.**	**Able to do in past 6 months but not today** **b.**	**Cannot do this test** **c.**
152.	Haemoglobin testing	1	2	3
153.	Complete blood count	1	2	3
154.	Malaria tests	1	2	3
155.	Blood glucose	1	2	3
156.	HIV testing	1	2	3
157.	Ziehl stains	1	2	3
158.	Gram stains	1	2	3
159.	Blood type and cross match	1	2	3
160.	Syphilis testing	1	2	3
161.	Urine analysis	1	2	3
162.	Stool direct microscopic examination	1	2	3
163.	Pregnancy testing	1	2	3
164.	Hepatitis testing	1	2	3
165.	Does the facility use external diagnostic services or an external laboratory?	YES……01 NO……02		

SECTION 9. PHARMACY FACILITIES

166.	Does this facility have a pharmacy or a separate room for drug storage?	YES……01 NO……02	**➔GO TO 169**
167.	Are there enough shelves for storing drugs/other supplies (nothing on the floor)?	YES……01 NO……02	
168.	Are the stored items protected from sun?	YES……01 NO……02	

SECTION 10. VACCINE CAPACITY

NOTE: ASK THESE QUESTIONS **ONLY** IF THE RESPONDENT ANSWERED "YES" TO **QUESTION 9** IN **SECTION 2**

169.	Are immunizations regularly given to children at this facility or in outreach EPI activities or both?	YES, AT FACILITY ONLY……..01 YES, AT OUTREACH ONLY……..02 YES, BOTH FACILITIES & OUTREACH…….03	**➔GO TO 171**
170.	How many EPI outreach activities were conducted in the past 3 months?	NUMBER EPI OUTREACH ACTIVITIES |__|__|__|	
CHECK RESPONSE TO QUESTION 144, IF "YES" ASK QUESTIONS 171 AND 172. IF "NO" GO TO 173.			
171.	How is the main vaccine refrigerator powered?	NONE……..01 FUEL……..02 ELECTRIC……..03 SOLAR……..04 GAS……..05 OTHER……06 _____ (*SPECIFY)*	
172.	Is the main vaccine refrigerator working?	YES……..01 NO……..02	

SECTION 11. MATERNAL AND NEONATAL CARE

173.	Are postpartum care services offered routinely?	YES, IN THE FACILITY AS PART OF ROUTINE SERVICES ONLY……..01 YES, IN THE FACILITY AS PART OF ROUTINE SERVICES AND IN SPECIAL CLINICS……..02 NO, NOT AS PART OF ROUTINE SERVICES BUT ONLY IN		
Are the following services provided?		**Yes**	**No**	
174.	Maternal examination & treatment	1	2	
175.	Breast feeding counseling	1	2	
176.	Newborn examination & treatment	1	2	
177.	Growth Monitoring & promotion	1	2	
178.	Vaccination counseling	1	2	
179.	Family planning counseling	1	2	
180.	PMTCT counseling	1	2	
181.	Dietary counseling for breastfeeding mother	1	2	

182.	Counseling on mother and child hygiene	1	2	

SECTION 12. MANAGEMENT AND SUPERVISION

SUPERVISOR/MONITOR LEVEL FROM WHICH THE SUPERVISOR CAME		Did the supervisor from [LEVEL] supervise/monitor this health facility in the last 3 months? 1=YES 2=NO	Which month and year did supervisor from [LEVEL] last visit?		What is the **annual** frequency of supervision/monitoring by [SUPERVISOR]? 1=MONTHLY 2=QUARTERLY 3=TWICE A YEAR 4=ANNUALLY	What topic was discussed at the last visit by [SUPERVISOR]? CHECK ALL THAT APPLY 1=QUALITY OF CARE 2=MANAGEMENT 3=RECORD KEEPING 4=DATA REPORTING 5=DATA USE
			MONTH	YEAR		
		a.	**b.**	**c.**	**d.**	**e.**
183.	Health Area (nurse in charge)	1 ➔ 2 **(⬇NEXT LEVEL)**	|__|__|	|__|__|__|__|	MONTHLY……..01 QUARTERLY……..02 TWICE A YEAR……03 ANNUALLY……04	QUALITY OF CARE……..01 MANAGEMENT……..02 RECORD KEEPKING……03 DATA REPORTING……..04 DATA USE……05
184.	Health Zone Office (MCZ)	1 ➔ 2 **(⬇NEXT LEVEL)**	|__|__|	|__|__|__|__|	MONTHLY……..01 QUARTERLY……..02 TWICE A YEAR……03 ANNUALLY……04	QUALITY OF CARE……..01 MANAGEMENT……..02 RECORD KEEPKING……03 DATA REPORTING……..04 DATA USE……05
185.	Health District (MCD)	1 ➔ 2 **(⬇NEXT LEVEL)**	|__|__|	|__|__|__|__|	MONTHLY……..01 QUARTERLY……..02 TWICE A YEAR……03 ANNUALLY……04	QUALITY OF CARE……..01 MANAGEMENT……..02 RECORD KEEPKING……03 DATA REPORTING……..04 DATA USE……05
186.	MOH Provincial (MIP)	1 ➔ 2 **(⬇NEXT LEVEL)**	|__|__|	|__|__|__|__|	MONTHLY……..01 QUARTERLY……..02 TWICE A YEAR……03 ANNUALLY……04	QUALITY OF CARE……..01 MANAGEMENT……..02 RECORD KEEPKING……03 DATA REPORTING……..04

						DATA USE……05
187.	Other _____ (SPECIFY)	1 ➔ 2 **(↓NEXT LEVEL)**	|__|__|	|__|__|__|__|	MONTHLY…… ……01 QUARTERLY…… ……02 TWICE A YEAR……03 ANNUALLY…… ……04	QUALITY OF CARE……..01 MANAGEMENT…… .02 RECORD KEEPKING……03 DATA REPORTING……..04 DATA USE……05

188.	Does this facility have routine meetings for reviewing managerial or administrative matters?	YES…… …….01 NO…… ……..02 DON'T KNOW……99	**GO TO 190**
189.	How often do meetings to discuss the facility managerial and administrative matters take place?	MONTHLY OR MORE OFTEN…… ……..01 EVERY 2-3 MONTHS……02 EVERY 4-6 MONTHS……03 LESS THAN EVERY 6 MONTHS OR IRREGULARLY…… ….04 DON'T KNOW……99	
190.	Are there any routine meetings about facility activities or management issues that include both facility staff and community members?	YES…… …….01 NO…… ……..02 DON'T KNOW……99	**GO TO 192**
191.	How often are routine meetings held with both facility staff and community members?	MONTHLY OR MORE OFTEN…… ……..01 EVERY 2-3 MONTHS……02 EVERY 4-6 MONTHS……03 LESS THAN EVERY 6 MONTHS OR IRREGULARLY…… ….04 DON'T KNOW……99	
192.	Is there a Hospital/facility community advisory committee in this area?	YES…… …….01 NO…… 02	
193.	Does this facility have any system for determining clients' opinions about the health facility or its services? **IF YES, CIRCLE ALL METHODS THAT ARE USED FOR ELICITING CLIENTS' OPINIONS. PROBE FOR ALL METHODS USED.**	SUGGESTION BOX…….01 CLIENT SURVEY FORM……02 CLIENT INTERVIEW ……03	

		OFFICIAL MEETING WITH COMMUNITY LEADERS.....04 INFORMAL DISCUSSIONS WITH CLIENT OR COMMUNITY.....05 OTHER.....06 _____ (SPECIFY) NO CLIENT FEEDBACK.....07 DON'T KNOW.....99	
194.	Does this facility routinely carry out quality assurance activities? By this I mean some formal review system or comparison of work or systems to a standard?	YES.....01 NO.....02 DON'T KNOW.....99	

SECTION 13 MEDICAL WASTE TREATMENT		
195.	What is this facility's disposal practice for sharps such as needles, glass, surgical instruments, etc.? (**CIRCLE THE CODES FOR ALL PRACTICES THAT ARE MENTIONED/OBSERVED IN RESPONSE TO THE QUESTION)**	INCINERATION .....01 BURN AND BURY .....02 BURY BUT DO NOT BURN .....03 BURN BUT DO NOT BURY .....04 USE SAFE BOX.....05 PUT IN A COVERED PIT (COULD BE LATRINE) .....06 PUT IN AN OPEN PIT .....07 STORE, COLLECT AND MOVE OFFSITE .....08 JUST THROW OUT IN THE OPEN .....09 OTHER .....96 _____ (SPECIFY)

196.	What is this facility's disposal practice for biomedical wastes such as placenta, human body parts, laboratory waste, etc.? (CIRCLE THE CODES FOR ALL PRACTICES THAT ARE MENTIONED/OBSERVED IN RESPONSE TO THEQUESTION)	INCINERATION ……..01 BURN AND BURY ……..02 BURY BUT DO NOT BURN ……..03 BURN BUT DO NOT BURY ……..04 USE SAFE BOX……05 PUT IN A COVERED PIT (COULD BE LATRINE) ……..06 PUT IN AN OPEN PIT ……..07 STORE, COLLECT AND MOVE OFFSITE ……..08 JUST THROW OUT IN THE OPEN ……09 OTHER ……96 _____ (SPECIFY)
197.	Does the facility have a picture on the wall for waste management/universal precautions?	YES……01 NO……02

SECTION 14. COMMUNITY FUNDING INITIATIVES			
198.	Is there a health cooperative (mutual)?	YES ..... 1 NO..... 2	
199.	Is there a community funding initiative of FOSA (IT payment salary, etc.)?	YES ..... 1 NO..... 2	
THANK YOU FOR YOUR TIME.			

Interview End Time: Hour |__|__| Minute |__|__|

Appendix 4: Consent form for health worker and health facility surveys

Tulane University Human Research Protection Office
Biomedical IRB Consent Form for Participation in a Research Study
Informed Consent for Health Facility Survey

Instructions to Interviewers

Before beginning each interview, greet the potential respondent and read the following statement aloud. Once you have finished reading the statement, indicate whether the respondent agrees to participate or not. Then sign the form to show that you asked the respondent to give informed consent. Use two copies of this form for each person that you ask permission to interview and turn one copy in to your supervisor with the questionnaires.

The following informed consent is required by Tulane University for any research study conducted by investigators at the University. This study has been approved by the University's Institutional Review Board for Human Subjects and the Kinshasa School of Public Health's ethical review board. No research activity is to be conducted until you have had an opportunity to review this consent form, ask any questions you may have, and sign this document if applicable.

Written permission was obtained from the site manager, the Ministry of Health and local officials prior to the interview. A copy of which was given to you. Please keep a copy with you in a place where you'll be able to access it at any time.

Principal Investigator: Dr. Joe Keating
Study Title: Evaluation of the Impact of the ASSP (*Accès aux Soins de Santé Primaires*) Project in the Democratic Republic of Congo
Performance Sites: Democratic Republic of Congo
Sponsor: DFID

INTRODUCTION

Hello. My name is _____ and I am doing a study to lean how well a health systems project is working in the Democratic Republic of Congo. In this study, we would like to know more about the availability and quality of health care services in the DRC. We would like to ask you some general questions about the facility in which you work, as well as some general information your skills and experiences as a health care provider.

WHY THE STUDY IS BEING DONE

Tulane University School of Public Health and Tropical Medicine, located in New Orleans, Louisiana, United States, the Kinshasa School of Public Health and IMA World Health want to learn if a health systems project is improving the availability and quality of health care services. The project incorporates a number of health financing, community engagement, and service quality improvement strategies.

We will be visiting people in their homes to ask general questions about their health and utilization of services, as well as visiting many different health facilities to gather information about the quality and availably of facilities and services. A maximum of 630 health care facilities will be included health facility survey, and in each of these facilities, we will be interviewing health care providers who are working in the facility.

WHEN IS THE STUDY BEING DONE

The data collectors will conduct the survey during the current visit and then will attempt to return to the health facility and conduct the full survey with each respondent two more times – in 2015 and 2017. You will be asked to consent before each interview.

WHAT THE STUDY PROCEDURES ARE AND WHAT YOU WILL BE ASKED TO DO

If you agree to participate, the research team will interview you regarding your experiences as a health care provider as well as ask some general questions about the health facility in which you work. We plan to ask you a few questions about your institution, personnel, the availability of medications and medical supplies, record keeping, educational materials and advocacy. This interview will take approximately 1 hour.

DISCLOSURE OF POTENTIAL CONFLICT OF INTEREST

The investigators in this study are all health professionals. They are interested in the knowledge to be gained from this study and in the well-being of members of the community. Investigators may obtain salary or other financial support for conducting the research. You are under no obligation to participate in any research study offered to you.

RISKS AND BENEFITS OF BEING INVOLVED IN THE STUDY

We realize that our presence might interfere with your work. We are not here to supervise your work. Should we observe any areas in which we believe the services might want to improve, we will discuss these openly and constructively at the end of our visit to this facility. We realize that you have a very busy schedule and that the interview may be an inconvenience.

There are no disadvantages to you participating in this study, other than having to answer some questions that might make you feel uncomfortable. We would like to remind you that you can refuse to answer any question at any time.

This study may not benefit you directly; however, it will help us to learn more about health care facilities and the availability of services in the DRC.

CONFIDENTIALITY

The information you provide will be kept private and it will not be shown to anyone else.

Although we have recorded your name on this questionnaire, we will remove your name once we transfer this information to the computer. Your name will not appear in any report, nor will we use any description that could identify you (such as "the doctor at Mama Yemo Hospital").

The research team will prepare the results in different formats: data on individual facilities, on all facilities in the health zone. Tulane University School of Public Health and Tropical Medicine, the Kinshasa School of Public Health, and local non-governmental organization will participate with the research team in publishing and distributing these results.

The following procedures will be used to protect the confidentiality of your data. The researchers will keep all study records locked in a secure location. Research records will be labeled with a unique code. A master key that links names and codes will be maintained in a separate and secure location. All electronic files (e.g., database, spreadsheet) containing identifiable information will be password protected. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords. Data that will be shared with others will be coded as described above to help protect your identity. At the end of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations. Any master key or other data described in this paragraph will be maintained in accordance with the security provisions of this paragraph until destroyed by the researchers.

You should also know that the Tulane University Human Research Protection Office and the Biomedical Institutional Review Board (IRB) may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

PARTICIPATION IS VOLUNTARY

Participation in this survey is voluntary, and the refusal to participate will not involve any penalty. You may also choose to discontinue participation at any time during this interview or future interviews, again without any penalty to yourself or your facility. You have the right to stop participating in the study at any point over the five year time period.

Take as much time as you like before you make a decision to participate in this study. If you have any questions about this study, please feel free to ask the data collector in charge in the field whose name and contact information is given below_____.
(Data Collector's Name Here)

If you want to voice concerns or complaints about the research or if you have a research-related problem, you may contact the country coordinator for this study whose name and contact information is given below.

Dr. Tshefu Kitoto Antoinette
Phone: 00243 81 01 56 910
Email: antotshe@yahoo.com

WILL I RECEIVE PAYMENT FOR PARTICIPATION?

You will not be paid to be in this study.

ARE THERE COSTS TO PARTICIPATE?

There are no costs to you to participate in this study.

WHO DO I CONTACT IF I HAVE QUESTIONS ABOUT THIS STUDY?

We will be happy to answer any question you have about this study. If you have further questions about this study, want to voice concerns or complaints about the research or if you have a research-related problem, you may contact the principal investigator, Joe Keating (+1-504-988-3655) or the Co-investigator, Dr. Tshefu Kitoto Antoinette (00243 81 01 56 910). If you would like to discuss your rights as a research participant, discuss problems, concerns, and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research, you may contact the Tulane University Human Research Protection Office at (+1-504-988-2665) or email at irbmain@tulane.edu.

INFORMED CONSENT

Do you have any questions?

Questions from the participant:

_____
_____
_____

Answers provided:

_____
_____
_____

Thank you very much for your time. Would you like to take part in this survey?

I have read this form and decided that I will participate in the research project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

_____ _____

Subject Date

Appendix 5a: Consent form for nurses (objectives 1 and 2)

Principal Investigator: Rishma Maini, MBChB
Co-Investigator: David Hotchkiss, PhD
Study Title: Health worker motivation in the DRC.
Sponsor: Interchurch Medical Assistance

The following informed consent is required by Tulane University for any research study conducted by investigators at the University. This study has been approved by the University's Institutional Review Board for Human Subjects.

Introduction

You are invited to participate in a research study to understand more about your experience of working in this health facility. You are being asked to participate because you are currently working in this facility. No research activity is to be conducted until you have had an opportunity to review this consent form, ask any questions you may have, and sign this document if applicable.

The main objective of this study is to understand health workers experiences of working in facilities, and what help health workers to be effective in their job, and what needs to be improved or changed. The information collected will guide decisions regarding changes which should be made in health facilities in order to improve the effectiveness of health workers and hence service delivery.

We would like to ask you about more about your role in the facility, the facility environment, what helps you to do your job effectively and what things hinder you in performing your job. We will also be asking some questions related to your income.

You have the right to refuse to participate in the study now or at any time during the interview. There are no penalties of any kind if you decide that you do not want to participate. You can also refuse to respond to specific questions if you choose. If you decide to participate, you will be asked to sign this form and it will be a record of your agreement to participate. You will be given a copy of this form.

The study will be carried out in eight health facilities of ASSP and the study will be conducted in Kasai Occidental province. In each facility we plan to carry out two interviews with nurses working there.

Why is this study being done?

The purpose of this research study is to understand the working environment of health workers in the DRC, and the experiences of health workers in delivering services. We also hope to understand what changes could be made to improve the ability of health workers to perform their job as effectively as possible.

What are the study procedures? What will I be asked to do?

If you agree to take part in this study, you will then be asked to participate in one interview which should last about an hour. Questions will be asked about the place where you work, and how you feel about working there. There will also be some questions relating to the income you receive in the facility. If you agree, the interview will be audio recorded for the study. We will conduct the interview in a private area of the facility today. After this interview, I may need to follow up to understand some of the points made during our talk and to ask some additional questions. We are hoping to interview a total of 16 people for this study.

If you agree to have our talk audio recorded, neither your name nor any other information that can identify who you are and will be linked to the audio recordings or any written documents created from the recordings. Only the people involved in the study will be permitted to listen to the recordings. Immediately following your interview you will be given the opportunity to have the recordings erased. The recordings will be written up by members of the research team and erased once the written document is checked for accuracy. The written document may be used in whole or in part for oral presentations or written documents that result from this study. Neither your name nor any other information that can identify who you are will be used in presentations or in written documents that result from this study.

What are the risks or inconveniences of the study?

We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study. You can refuse to answer any questions during the discussion. The initial discussion will take about an hour of your time. Any discussions carried out later will probably be shorter.

We understand the possibility of problems in keeping the information we collect confidential, or private, and are taking measures to prevent that your name is linked to the information collected. All the information obtained from you will be kept in a secure location and will be strictly used for the purpose of this study. If you have any concerns regarding our study, please use the contact information below to express your concerns.

What are the benefits of the study?

You will not receive any direct benefit from taking part in the study. By talking to you, we will be able to understand changes that are needed to improve working conditions for health workers in order for them to be more effective.

Will I receive payment for participation?

You will not be paid to be in this study. Your participation in the study is for voluntary. You will not be provided with any reward or payment to participate in the study.

Are there costs to participate?

There are no costs to you to participate in this study.

How will my personal information be protected?

The following procedures will be used to protect the confidentiality of your data. The researchers will keep all study records locked in a secure location. Research files and documents will be marked with a special code. A list that includes the names of people who participated in the study and special codes for each name will be kept in a separate and secure location. All computer files that include information that can be used to identify your name will be protected by a password. Any computer containing these files will also have a special password to prevent use by people not participating in the study. Only the members of the research staff will have access to the passwords and any other information you provide. At the end of this study, the researchers may share the findings. Information will be presented in a summary format and you will not be identified in any printed documents or presentations. Any list of codes, audio recording, and other information described in this paragraph will be kept as explained in this paragraph until they are destroyed by the researchers five years after the study. Audio recordings will be written up by a member of the staff.

You should also know that the ethics committees of Tulane University and the University of Kinshasa School of Public Health may inspect study records, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB or ethics committee is a group of people who review research studies to protect the rights and well-being of research participants.

Can I stop being in the study and what are my rights?

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate. You also do not have to answer any question that you do not want to answer.

Who do I contact if I have questions about the study?

Take as much time as you like before you make a decision to participate in this study. Feel free to ask me any questions you have about the study. If you have questions about this study that I cannot answer, or if you feel that you have been treated unfairly or have been hurt by joining the study, you may contact Rishma Maini who is in charge of the study, at Tel: 0817106670 or David Hotchkiss who is the co-investigator of the study, at +504 988-3289.

If you have any questions, concerns, or complaints about your rights as a research subject or want to speak to someone who is not included in in the research, you can contact the Kinshasa School of Public Health Ethics Committee, Félicien Munday Mulop, Tel: 0998419816 or Tulane University Human Research Protection Office (HRPO) Tel: +504 988-2665; email at irbmain@tulane.edu.

Consent to Audio:

This study involves **audio recording of your participation.** Neither your name nor any other identifying information will be associated with the **audio recordings or any**

transcripts created from them. Only the researchers will be permitted to **listen to** the recordings.
Immediately following the interview, you will be given the opportunity to have the recordings erased.

Please initial one of each pair of options.

___ I consent to have my participation recorded.

___ I do not consent to have my participation recorded

___ I consent to have my recorded participation transcribed into written form.

___ I do not consent to have my recorded participation transcribed.

The recordings will be transcribed by the researcher and erased once the transcriptions are checked for accuracy. Transcripts of your participation may be reproduced in whole or in part for use in presentations or written products that result from this study. Neither your name nor any other identifying information such as your voice will be used in presentations or in written products resulting from the study.

___ I consent to the use of the written transcription in presentations and written products resulting from the study provided that neither my name nor other identifying information will be associated with the transcript.

___ I do not consent to the use of my written transcription in presentations or written products resulting from the study.

The above permissions are in effect until August 2015. On or before that date, the tapes will be destroyed.

_____ _____
Subject Date

_____ _____
Legally Authorized Representative (if applicable) Date

_____ _____
Person Obtaining Consent Date

Documentation of Consent:

I have read this form and decided that I will participate in the research project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

_____	_____
Subject	Date
_____	_____
Legally Authorized Representative (if applicable)	Date
_____	_____
Person Obtaining Consent	Date

I am unable to read but this consent document has been read and explained to me by _____ . I volunteer to participate in this research.

_____	_____
Subject	Date
_____	_____
Witness	Date
_____	_____
Person Obtaining Consent	Date
_____	_____
Principal Investigator Signature	Date

Appendix 5b: Topic Guide for in-depth interviews with nurses

Note to interviewer on logistics:

Conduct interview in a private place. Interviews should be tape-recorded subject to consent.

Selecting interviews:

Choose 8 nurses in facilities previously receiving salary supplements and 8 nurses in facilities where salary supplements were never operational.

Respondents:

Gather basic information about the respondents before the interview and assign a code to him/her. Only use the assigned code for the interviewee in the notes/transcript, together with notes about gender, age, etc.

Introducing the interview – see consent form for participants

Topic Guide

Key area of investigation	Rationale	Themes	Example questions	Explanatory notes
Health facility environment	Introductory questions to encourage nurses to discuss the health facility within which they work in and what their everyday job is like. This will give an idea of context. Also explore reasons for doing their job, which may be linked to intrinsic motivation. Also start to explore nurse's perceptions of the facility and challenges associated with their work.	• History of working for the facility • Health facility environment • Perceptions of quality of health facility services • Barriers or facilitators in performing job in facility • Relationship with other staff	1. What made you want to become a nurse? 2. Can you tell me for how long you have worked in this facility? 3. What services do you directly provide at the facility? 4. Do you think that the clinic provides good services to the community? Can you give examples? 5. What features of the services do you think are good and what bad? Can you give examples? 6. How does this service compare with the services offered at other facilities? 7. Do you think the facility has a good reputation with the community? (Please give reasons for your answer) 8. What prevents you from doing your job effectively at this facility? Can you give examples? 9. What would allow you to do your job more effectively? Can you give examples?	Deliberately don't start with challenges of doing the job. Want to understand the everyday context within which the nurse operates, and encourage them to talk in a more informal way. Also may discuss features of the environment (extrinsic factors) which may affect the "can do" component of motivation. When asking about challenges or reputation of the facility, may be worthwhile emphasising the confidentiality of the interview.

			10. How would you describe your relationship with other staff in the hospital?	
Organisational commitment	To explore the commitment of the nurse to the organisation, and this should lead into discussion of whether the nurse's goals are aligned with that of the organisation and perceptions of management of the facility.	• Commitment to organisation • Factors which affect commitment to the organisation • Perception of management of the facility	11. Do you feel that there is a strong commitment to delivering good health care at this facility? 12. Do you think the commitment of health workers is different in different sectors (private, for-profit, not-for-profit)? Why? 13. How likely is it that you will be working at this facility three years from now? Why or why not? If not, where do you think you will be working and why? What would encourage you to stay? 14. What are your thoughts on the way the facility you work in being managed? 15. If you could change anything about how the facility is managed, what would you change?	Want to understand whether the nurse's goals are aligned with what they perceive to be the organisational goals (the "will do" component of motivation) Also want to understand the organisational environment within which the nurse is working (extrinsic factors).
Incentives and income	To understand the non-financial and financial incentives affecting nurses. To also explore the perception of the job itself and the role of government	• Non-financial incentives • Financial incentives	16. How valued do you feel by your employer? Why or why not? 17. What are some of the ways your employer shows that they value you as a professional? Can you give any examples? 18. Does your facility or employer do/give you anything if you perform well at work? If yes, can you please explain? Does this	Important to get a picture of the different incentives nurses are exposed to. Also, whether these incentives are perceived to change how the nurse works, and which ones are deemed to be important. These questions are likely to be more sensitive hence they are being raised later on

			influence how you work? If so, in what way? 19. What are your sources of income? 20. How often are you paid from each source? 21. Do you receive any allowances or other benefits e.g. accommodation etc. Can you please elaborate? 22. Do you have to work elsewhere to supplement your income? If so, can you please give details? 23. Do you feel you are well compensated for the work you do? Please give reasons for your answer. 24. How do you feel currently about the way you are compensated *by the government* for the work you do? 25. Do you think the government currently fulfils its responsibility to health workers? Please give reasons for your answer. 26. What changes, if any, would you like to see in the future in terms of how the health system operates in the DRC?	in the interview, once rapport has been established.

Motivational outcomes – job satisfaction and behaviour	To give some contextual understanding around how nurses behave in the workplace, and factors influencing job satisfaction.	• Behaviour and coping strategies of nurses • Job satisfaction	27. In many countries, communities complain about the quality of health services. For example, there are often complaints that health workers are not very motivated, that they do not spend as much time as they should doing their job, that they are competent at their job, and even sometimes that they are involved in illegal activities such as stealing drugs and material and charging too much for services. How do you feel that the situation is in the DRC? 28. Do you think most health workers are satisfied with their job? Why do you think some health workers are unsatisfied in their job? 29. What aspects of how the staff behave and do their work are good and what are bad? Can you give examples for each? 30. What drives you to do your job? Can you give any concrete examples?	Where the nurse may be struggling to talk about anything that they feel may incriminate them (e.g. charging informal payments), then you should use hypothetical situations – what would happen if etc.? Again, it may be worthwhile emphasising the confidentiality of the interview.
For facilities where primes were removed only Effect of removing primes	To explore nurses perceptions of (1) the payment of primes, (2) how primes were removed, and (3) a description of any changes in behaviour following the removal of primes	• Perceptions of donor-funded primes • Perceptions on why primes were removed and process of communicating the	31. What did you think about the payment of “primes” in the old Access to healthcare programme? Did you agree with it or disagree with it? Can you give reasons for your answer? 32. Did you understand the reasons why the primes were removed?	Need to understand the strengths and weaknesses around the process of removing primes so lessons can be learned and applied to other programmes. Also to gain an understanding of any negative or positive consequences as a result of removing primes.

		removal of primes to nurses • Behaviour following removal of primes	What do you think these reasons were? 33. Was it adequately explained to you that primes would be removed? Who explained that this would occur? 34. How did you feel when the salary supplements were removed? Did you change your behaviour in any way? Did you see any change in behaviour in your colleagues? 35. How have you coped with the removal of primes? Have you done anything to supplement your income since they have been removed?	
Finish by asking for advice from nurses (if not already covered) on what strategies nurses think would be likely to lead to improvements in nurse behaviour and satisfaction.				

Conclusion

Thank you very much for your time, it's been really interesting to hear about your experiences and views.

I have asked so many questions, do you have any further questions?

Again thank you. And let me just remind you that, as I said at the start, this interview will be confidential no one will know what you personally have said.

Appendix 6a: Consent form key stakeholders (objective 3)

Principal Investigator: Rishma Maini, MBChB
Co-Investigator: David Hotchkiss, PhD
Study Title: Health Worker Motivation in the DRC
Sponsor: Interchurch Medical Assistance

The following informed consent is required by Tulane University for any research study conducted by investigators at the University. This study has been approved by the University's Institutional Review Board for Human Subjects.

Introduction

You are invited to participate in a research study to understand more about the pilot intervention affecting human resources for health within the ASSP programme. No research activity is to be conducted until you have had an opportunity to review this consent form, ask any questions you may have, and sign this document if applicable. The main objective of this study is to understand whether the activities of the intervention are being implemented as planned, any strengths and weaknesses, as well as any ways to improve the intervention. The information collected will guide decisions regarding changes in intervention activities.

We are asking you to participate in the study because we know that you are either involved or will be affected by the intervention. We would like to learn more about your views on the intervention preparations and activities, including any benefits and problems that have occurred thus far. We would like to ask you about how you are involved in the project, and how the project activities could be improved.

You have the right to refuse to participate in the study now or at any time during the interview. There are no penalties of any kind if you decide that you do not want to participate. You can also refuse to respond to specific questions if you choose. If you decide to participate, you will be asked to sign this form and it will be a record of your agreement to participate. You will be given a copy of this form.

The study will be carried out mainly in Kinshasa with a total of 18 people who are known to be involved or affected by the intervention.

Why is this study being done?

We are working with a university in the United States called Tulane University. The research will be carried out to understand how the intervention itself, and to learn about ongoing intervention activities. We also hope to understand successes and failures associated with the intervention, as well as any outcomes that were not planned. One component of the study is to talk to people who have directly influenced or been involved in the planning and/or implementation of the intervention. We will also talk to those who are directly affected by the activities of the intervention.

What are the study procedures? What will I be asked to do?

If you agree to take part in the study, I will ask you to participate in one interview which should last about an hour. If you agree, the interview will be audio recorded for the study. After the first interview, I may need to follow up to understand some of the points made during our talk and to ask some additional questions. We are hoping to interview a total of 18 people for this study.

If you agree to have our talk audio recorded, neither your name nor any other information that can identify who you are and will be linked to the audio recordings or any written documents created from the recordings. Only the people involved in the study will be permitted to listen to the recordings. Immediately following your interview you will be given the opportunity to have the recordings erased. The recordings will be written up by members of the research team and erased once the written document is checked for accuracy. The written document may be used in whole or in part for oral presentations or written documents that result from this study. Neither your name nor any other information that can identify who you are will be used in presentations or in written documents that result from this study.

What are the risks or inconveniences of the study?

There are no known risks in taking part in the study. You can refuse to answer any questions during the discussion. A possible problem may be the time it takes to complete the discussion. The initial discussion will take about an hour of your time. Any discussions carried out later will probably be shorter.

We understand the possibility of problems in keeping the information we collect confidential, or private, and are taking measures to prevent that your name is linked to the information collected. All the information obtained from you will be kept in a secure location and will be strictly used for the purpose of this study. If you have any concerns regarding our study, please use the contact information below to express your concerns.

What are the benefits of the study?

You will not receive any direct benefit from taking part in the study. By talking to you, we will be able to understand changes that are needed to improve working conditions for health workers in order for them to be more effective.

Will I receive payment for participation?

You will not be paid to be in this study. Your participation in the study is for voluntary. You will not be provided with any reward or payment to participate in the study.

Are there costs to participate?

There are no costs to you to participate in this study.

How will my personal information be protected?

The researchers will keep all study records locked in a secure location. Research files and documents will be marked with a special code. A list that includes the names of people who participated in the study and special codes for each name will be kept in a separate and secure location. All computer files that include information that can be used to identify your name will be protected by a password. Any computer containing these files will also have a special password to prevent use by people not participating in the study. Only the members of the research staff will have access to the passwords and any other information you provide. At the end of this study, the researchers may share the findings. Information will be presented in a summary format and you will not be identified in any printed documents or presentations. Any list of codes, audio recording, and other information described in this paragraph will be kept as explained in this paragraph until they are destroyed by the researchers five years after the study. Audio recordings will be written up by a member of the staff.

You should also know that the ethics committees of Tulane University and the University of Kinshasa School of Public Health may inspect study records, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB or ethics committee is a group of people who review research studies to protect the rights and well-being of research participants.

Can I stop being in the study and what are my rights?

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

Who do I contact if I have questions about the study?

Take as much time as you like before you make a decision to participate in this study. Feel free to ask me any questions you have about the study. If you have questions about this study that I cannot answer, or if you feel that you have been treated unfairly or have been hurt by joining the study, you may contact Rishma Maini who is in charge of the study, at 0817106670 or David Hotchkiss who is the co-investigator of the study, at +504 988-3289.

If you have any questions, concerns, or complaints about your rights as a research subject or want to speak to someone who is not included in in the research, you can contact the Kinshasa School of Public Health Ethics Committee, Félicien Munday Mulop, Tel: 998419816 or Tulane University Human Research Protection Office (HRPO) Tel: +504 988-2665; email at irbmain@tulane.edu.

Consent to Audio:

This study involves **audio recording of your participation.** Neither your name nor any other identifying information will be associated with the **audio recordings or any transcripts created from them.** Only the researchers will be permitted to **listen to** the recordings. Immediately following the interview, you will be given the opportunity to have the recordings erased.

Please initial one of each pair of options.

___ I consent to have my participation recorded.

___ I do not consent to have my participation recorded

___ I consent to have my recorded participation transcribed into written form.

___ I do not consent to have my recorded participation transcribed.

The recordings will be transcribed by the researcher and erased once the transcriptions are checked for accuracy. Transcripts of your participation may be reproduced in whole or in part for use in presentations or written products that result from this study. Neither your name nor any other identifying information such as your voice will be used in presentations or in written products resulting from the study.

___ I consent to the use of the written transcription in presentations and written products resulting from the study provided that neither my name nor other identifying information will be associated with the transcript.

___ I do not consent to the use of my written transcription in presentations or written products resulting from the study.

The above permissions are in effect until August 2015. On or before that date, the tapes will be destroyed.

_____	_____
Subject	Date
_____	_____
Legally Authorized Representative (if applicable)	Date
_____	_____
Person Obtaining Consent	Date

Documentation of Consent:

I have read this form and decided that I will participate in the research project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

_____	_____
Subject	Date
_____	_____
Legally Authorized Representative (if applicable)	Date
_____	_____
Person Obtaining Consent	Date

I am unable to read but this consent document has been read and explained to me by _____ . I volunteer to participate in this research.

_____	_____
Subject	Date
_____	_____
Witness	Date
_____	_____
Person Obtaining Consent	Date
_____	_____
Principal Investigator Signature	Date

Appendix 6b: Topic Guide for in-depth interviews with key stakeholders (objective 3)

Stakeholders: DFID / Government Ministries / IntraHealth / IMA / World Bank

Note to interviewer on logistics:
Conduct interview in a private place. Interviews should be tape-recorded subject to consent.

Respondents:
Gather basic information about the respondents before the interview and assign a code to him/her. Only use the assigned code for the interviewee in the notes/transcript.

Introducing the interview – see consent form for participants

Topic Guide

Key area of investigation	Rationale	Themes	Example questions	Explanatory notes
Knowledge of the HR intervention	Introductory questions to encourage stakeholders to reveal their interpretation and understanding of the HR intervention. Also start to explore the role of the stakeholder in the intervention and how their actions may moderate the intervention itself.	• Understanding of what the intervention will do • Changes made to the intervention • Perceptions of stakeholder's role in the implementation of the intervention	1. Can you start off by telling me what you know about the HR intervention planned in ASSP? 2. What problems do you think this is trying to address? 3. What is/are the overall goal/goals of the intervention? 4. What activities are planned in order to achieve these goals? 5. How did the choice of these activities come about? 6. How will these activities achieve the intended goal/vision, and through which mechanisms? 7. Do you know of any changes which have been made to the intervention during the pilot? If so, what are they? 8. What has been your role in the intervention to date?	This will allow the interviewer to gauge the respondent's knowledge and understanding as well as involvement in the intervention.
Theory of Change	To explore the stakeholder's understanding of theory of change, and how it applies to the intervention. Also to identify areas of risk/contention/gaps with	• Understanding of principles of theory of change • Understanding of how theory of change	9. Are you familiar with Theories of Change? (Explain using a brief description if necessary). 10. Below is a theory of change which has been devised together with relevant stakeholders. Starting with inputs, followed by outputs through	The interviewer will use a visual theory of change map when discussing this element with stakeholders. The interviewer should think about how best to extract individual opinion as opposed to

	respect to the intervention.	applies to the intervention • Gaps in the intervention • Participation of stakeholders in implementation • Risks associated with the intervention • Threats to the intervention • Stakeholder's perceptions of the intervention and activities	to outcomes and impact, are there any gaps that you can identify based on your knowledge of the planned interventions? Is there anything in there which you do not agree with? Are there any activities missing which we would should be doing? 11. Who will be involved in implementing these activities and in taking action to achieve the goal? 12. How will each actor be involved? 13. What are their roles? 14. Why are they crucial for this intervention (probe: what resource they bring in, etc)) 15. Which parts of the theory of change seem to carry the highest risk? In other words, what threats are there to the intervention not being executed as planned? 16. Overall, do you agree with the approach being adopted? Please give reasons for your answer.	the "party-line" response. They should also be cognisant and reflect on their position in relation to the interviewee (e.g. is the interviewee perceived as being a member of DFID etc.) and emphasise that they will not be individually identified by their responses.
Implementation of the intervention	To better understand the current state of implementation of the intervention and contextual factors affecting the intervention.	• Implementation fidelity (dose, coverage, execution) • Intended consequences	17. Are the activities being implemented as you had envisaged (execution)? If not, please elaborate. Has the expected population been reached (coverage), and have they received the intervention as intended (dose)? 18. What has happened so far that you didn't expect?	The interviewer should seek to probe for strengths and weaknesses of the intervention, as well as understand the roles played by stakeholders and how they may influence implementation of the intervention.

		• Unintended consequences • Enabling factors • Bottlenecks • Facilitating strategies • Participant responsiveness • Contextual factors	19. Were the necessary inputs supplied by the project (technical input, equipment, managerial and training support)? 20. Were there any particular opportunities the HR interventions could capitalise on? 21. What (contextual) factors/who have been the important elements so far in enabling the HR interventions to happen? 22. What (contextual) factors/who has impeded the HR interventions? 23. How do you expect the health workers to react to these activities? Why do you expect that?	The information will be used to refine the intervention if necessary.
Next steps	To explore where the intervention can be changed in order to enhance the chance of success	• Changes needed to the intervention	24. What do you think will be needed to insure that the HR activities succeed and have a sustained impact on health workers? 25. Do you have any suggestions regarding ways to improve the HR intervention design and/or activities?	Information will be used to inform ongoing implementation so that the intervention can be refined if necessary.

Conclusion
Thank you very much for your time, it's been really interesting to hear about your experiences and views.

I have asked so many questions, do you have any further questions?

The next step is that I'm going to go away and put together a combined Theory of Change for the HR interventions, based on this interview and the other interviews I'm conducting with key stakeholders. I'd like to forward the final version to you to let you feedback on it, if that would be OK?
Again thank you. And let me just remind you that, as I said at the start, this interview will be confidential no one will know what you personally have said.

Appendix 6c: Topic Guide for in-depth interviews with key stakeholders (2)

Stakeholders: Health Workers/NGO implementing partners

Note to interviewer on logistics:

Conduct interview in a private place.

Respondents:

Gather basic information about the respondents before the interview and assign a code to him/her. Only use the assigned code for the interviewee in the notes/transcript.

Introducing the interview – see consent form for participants

Topic Guide

Key area of investigation	Rationale	Themes	Example questions	Explanatory notes
Knowledge of the HR intervention	Introductory questions to encourage respondents to reveal their awareness and involvement in the intervention.	• Understanding of what the intervention is • Understanding of what the intervention will achieve • Involvement in the intervention	1. Can you start off by telling me what you know about the HR interventions planned in ASSP? 2. What do you think the HR interventions are intending to achieve? 3. What do you think is/are the overall goal/goals of the intervention? 4. Do you know about the activities planned in order to achieve these goals? If so, what are they? 5. To what extent have your views been solicited on the HR interventions planned within the programme?	This will allow the interviewer to gauge the respondent's knowledge and understanding of the intervention.
Theory of Change	To explore the respondent's understanding of theory of change, and how it applies to the intervention. Also to identify areas of risk/contention/gaps.	• Understanding of principles of theory of change • Understanding of how theory of change applies to the intervention • Gaps in the intervention • Risks associated with the intervention	6. Are you familiar with Theories of Change? (Explain using description if necessary). 7. Below is a theory of change that has already been devised together with relevant stakeholders. Starting with inputs, followed by outputs through to outcomes and impact, are there any gaps that you can identify based on your knowledge of the planned interventions? Is there anything	The interviewer will use a visual theory of change map when discussing this element. For NGO implementing partners, the interviewer should think about how best to extract individual opinion as opposed to the "party-line" response. They should also be cognisant and reflect on their position in relation to the interviewee (e.g. is the interviewee

		• Threats to the intervention • Respondent's perceptions of the intervention and activities	in there which you do not agree with? Are there any activities missing which we would should be doing? 8. Which parts of the intervention seem to carry the highest risk? In other words, what threats are there to the intervention not being executed as planned? 9. Overall, do you agree with the approach being adopted? Please give reasons for your answer.	perceived as being a member of DFID etc.) and emphasise that they will not be individually identified by their responses. For health workers, the interviewer may need to explain the theory of change in a lot of detail, as it will be unlikely they will have ever come across this before. The interviewer may also have to explain the intervention activities as it is possible that the health workers are not aware of it.
Implementation of the intervention	To better understand the current state of implementation and contextual factors affecting the intervention.	• Intended consequences • Unintended consequences • Participation in implementation • Enabling factors • Bottlenecks	10. Do you think the HR interventions are being implemented as planned? 11. What positive things have you seen happen as a result of the intervention? 12. What negative things have you seen as a result of the intervention? 13. Do you feel sufficiently involved and consulted in the process? 14. Do you know of anything which has helped the activities to occur? 15. Do you know of anything that has prevented certain activities from taking place?	As above, the health worker may not be aware of the status of implementation. However, the interviewer should try and probe for their opinion on risks associated with the intervention and whether there are any gaps in activities.

Next steps	To explore where the intervention can be changed in order to enhance the chance of success	• Changes needed to the intervention	16. What do you think will be needed to insure that the HR activities succeed and have a prolonged impact on health workers? 17. Do you have any suggestions regarding ways to improve the HR intervention design and/or activities?	Information will be used to inform ongoing implementation so that the intervention can be refined if necessary.

Conclusion
Thank you very much for your time, it's been really interesting to hear about your experiences and views.

I have asked so many questions, do you have any further questions?

The next step is that I'm going to go away and put together a combined Theory of Change for the HR interventions, based on this interview and the other interviews I'm conducting with key stakeholders. I'd like to forward the final version to you to let you feedback on it, if that would be OK?
Again thank you. And let me just remind you that, as I said at the start, this interview will be confidential no one will know what you personally have said.

Appendix 7: Ethics approval from Tulane University

Tulane Human Research Protection Program
Institutional Review Boards
Biomedical
Social Behavioral
FWA00002055

DATE: September 18, 2014

TO: Rishma Maini, BSc MBChB MPH
FROM: Tulane University Biomedical IRB

STUDY TITLE: [633280-2] Health Worker Motivation in the DRC
IRB REFERENCE #: 14-633280
SUBMISSION TYPE: Response/Follow-Up

ACTION: **APPROVED**

APPROVAL DATE: September 18, 2014

EXPIRATION DATE: August 7, 2015

REVIEW TYPE: Expedited Review
PROJECT RISK LEVEL: Minimal Risk

Thank you for your recent initial submission. The Tulane University Institutional Review Board has approved your submission.

This approval is based on an appropriate risk/benefit ratio and a study design where the risks have been minimized. All research must be conducted in accordance with this approved submission.

The following items were included in this submission:

- Amendment/Modification - Approval of amendment to consent forms by KSPH (UPDATED: 09/8/2014)
- Consent Form - Consent form approved by KSPH for key stakeholders (UPDATED: 09/8/2014)
- Consent Form - Consent form approved by KSPH for nurses (UPDATED: 09/8/2014)
- Cover Sheet - Cover letter re conditional approval (UPDATED: 09/8/2014)
- Other - Approval of protocol by KSPH (UPDATED: 09/8/2014)
- Training/Certification - Training certificate for Cele (UPDATED: 09/8/2014)
- Training/Certification - CITI training reseracher Anicet (UPDATED: 09/8/2014)
- Tulane - Application for Human Subjects Research, Part 1 - Tulane - Application for Human Subjects Research, Part 1 (UPDATED: 09/18/2014)
- Application Form - Application part 2 (UPDATED: 08/6/2014)
- Consent Form - Consent form for key stakeholders - French (UPDATED: 08/7/2014)

- Consent Form - Consent form for key stakeholders - English (UPDATED: 08/7/2014)
- Consent Form - Consent form for nurses - French (UPDATED: 08/7/2014)
- Consent Form - Consent form for nurses - English (UPDATED: 08/7/2014)
- Cover Sheet - Cover sheet (UPDATED: 08/7/2014)
- Data Collection - Topic guide for key stakeholders 2 - French (UPDATED: 08/7/2014)
- Data Collection - Topic Guide for key stakeholders 1 - French (UPDATED: 08/7/2014)
- Data Collection - Topic Guide for interviews with key stakeholders 2 - English (UPDATED: 08/7/2014)
- Data Collection - Topic Guide for interviews with key stakeholders 1 - English (UPDATED: 08/7/2014)
- Data Collection - Topic Guide for nurses - French (UPDATED: 08/4/2014)
- Data Collection - Topic Guide Nurses - English (UPDATED: 08/4/2014)
- Letter - Letter of invitation from IMA (UPDATED: 07/17/2014)
- Protocol - Protocol - English (UPDATED: 08/7/2014)
- Training/Certification - Certificate of translation of documents (UPDATED: 08/7/2014)
- Training/Certification - CITI training David Hotchkiss (UPDATED: 08/6/2014)
- Training/Certification - Certificate for completion of CITI training (UPDATED: 08/4/2014)
- Training/Certification - Training in FCOI (UPDATED: 07/16/2014)

In accordance with 45 CFR 46.110(b)(2), the Tulane University Biomedical IRB has provided an expedited review and acknowledgment of the local ethics approval letter from the Kinshasa School of Public Health. The IRB acknowledges the Kinshasa School of Public Health approval for the use of Tulane IRB approved consent documents.

In addition, the IRB acknowledges the addition of Cele Manianga and Anicet Yemweni Dangu to the study team.

Criteria for approval of research is in accordance with 45 CR 46.111(a)(1-7).

This study is approved for the enrollment of 34 subjects; 16 nurses and 18 stakeholders. IRB approval for this study will expire August 7, 2015.

Please Note:

- This research study has been approved for the enrollment of 34 subjects. An Amendment must be submitted, reviewed, and approved before exceeding this amount.
- The Tulane University IRB approved and stamped consent/assent documents are to be utilized when enrolling subjects.

Proposed changes to the research must be submitted to the IRB for review and approved prior to implementation, unless a change is necessary to avoid immediate harm to subjects.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of their signed consent form unless this requirement has been waived by the IRB.

Any Unanticipated Problems involving Risk to Subjects or Others, Deviations from the approved research, Non-Compliance, and Complaints must be reported to the IRB in accordance with Tulane HRPP policies and procedures. If this study includes ongoing oversight by a Data Safety Monitoring Board (DSMB) or other such committee, reports generated by the DSMB or oversight committee must be submitted to the IRB.

Continuations must be submitted in accordance with Tulane HRPP policies and procedures. The federal regulations provide for no grace period. Failure to obtain approval for continuation of your study prior to the expiration date will require discontinuation of all research activities for this study, including enrollment of new subjects.

When all study activities and data analysis have been completed, please notify the IRB within 30 days by submitting a Study Closure Form.

If you have any questions regarding this approval, please contact the HRPO at (504) 988-2665 or irbmain@tulane.edu.

Sincerely,
Tulane University Human Research Protections Office
1440 Canal St, Suite 1705, TW-36
New Orleans, LA 70112

Please note that the actual signature by the IRB Chair(s) is not required for this document to be effective since it is generated by IRBNet pursuant to the IRB Chair's electronic signature and approval. This process is consistent with Federal Regulations and Tulane standard operating policies with respect to the IRB and Human Research Protection Office, which consider electronically generated documents as official notice to sponsors and others of approval, disapproval or other IRB decisions. Please refer to the HRPO website at http://tulane.edu/asvpr/irb to refer to Tulane's Electronic Signatures and Records Policy.

Appendix 8: Ethics approval from the Kinshasa School of Public Health

REPUBLIQUE DEMOCRATIQUE DU CONGO
Ministère de l'Enseignement Supérieur, Universitaire et Recherche Scientifique
Université de Kinshasa
ECOLE DE SANTE PUBLIQUE
COMITE D'ETHIQUE *No d'Approbation: ESP/CE/024../2014*

Kinshasa, le 04 août 2014

A Monsieur l'Investigateur Principal
Tulane International
Université de Kinshasa
République Démocratique du Congo

Objet: Avis favorable concernant l'étude: « *La motivation du personnel de santé en RDC*».

Monsieur l'Investigateur Principal,

Le Comité d'Ethique de l'Ecole de Santé Publique de l'Université de Kinshasa a bien reçu le protocole dont le titre est repris en marge.

Après examen du protocole selon les normes d'éthique nationales sur les études impliquant les êtres humains, le Comité a donné un avis favorable à cette recherche et autorise sa mise en œuvre pour la période allant du 04 août 2014 au 03 août 2015.

Veuillez agréer, Monsieur l'Investigateur Principal, l'expression de notre considération distinguée.

Prof. BONGOPASI MOKE SANGOL

Vice Président du Comité Ethique

ESP UNIKIN COMITE D'ETHIQUE

Appendix 9: Ethics approval from London School of Hygiene and Tropical Medicine

London School of Hygiene & Tropical Medicine
Keppel Street, London WC1E 7HT
United Kingdom
Switchboard: +44 (0)20 7636 8636

www.lshtm.ac.uk

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Observational / Interventions Research Ethics Committee

Dr. Rishma Maini
Research Degree Student
PHP
LSHTM

7 October 2014

Dear Dr. Maini,

Study Title: Health worker motivation in the Democratic Republic of Congo

LSHTM Ethics Ref: 8475

Thank you for your letter of 23 September 2014, responding to the Observational Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Approval is dependent on local ethical approval having been received, where relevant.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type	File Name	Date	Version
Protocol / Proposal	Protocol_Format_for_health_worker_study_for IRBv2.0 23092014.docx	23/09/2014	2
Information Sheet	Consent form interviews with nursesV2.0 23092014.docx	23/09/2014	2
Information Sheet	Consent form interviews with key stakeholdersV2.0 23092014.docx	23/09/2014	2

After ethical review

Any subsequent changes to the application must be submitted to the Committee via an Amendment form on the ethics online applications website. The Principal Investigator is reminded that all studies are also required to notify the ethics committee of any serious adverse events which occur during the project via an Adverse Event form on the ethics online applications website. At the end of the study, please notify the committee via an End of Study form on the ethics online applications website. Ethics online applications website link: http://leo.lshtm.ac.uk

Yours sincerely,

Professor John DH Porter
Chair

ethics@lshtm.ac.uk
http://www.lshtm.ac.uk/ethics/

Appendix 10: Joint report with World Bank on health worker remuneration

Joint World Bank-DFID Report on revenues of Human Resources for Health (HRH) in the Democratic Republic of Congo

Prepared by Dr. Rishma Maini, Public Health Specialist at Tulane International L.L.C

in collaboration with: Maria Paola Bertone, Grégoire Lurton (consultants to the World Bank)

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Abbreviations

ASSP	Accès aux Soins de Santé Primaires
CS	Centres de Santé (health centres)
CSR	Centres de Santé Reference (reference health centres)
DFID	Department for International Development
DRC	Democratic Republic of Congo
FC	Francs Congolais (Congolese Francs)
IMA	Interchurch Medical Assistance
KSPH	Kinshasa School of Public Health
ODK	Open Data Kit
PARSS	Projet d'Appui à la Réhabilitation du Secteur de la Santé
PPS	Probability Proportional to Size
ZS	Zone de Santé (Health Zone)

Introduction: The Health Sector in the Democratic Republic of Congo

The Democratic Republic of Congo (DRC) is a vast country rich in mineral resources, with the potential for significant economic growth. However, multiple political, social and economic crises over the years have led to the DRC being classified as a fragile state.

Despite a peace deal in 2002 after the war and the formation of a transitional government in 2003, the DRC remains affected by conflict in the East.[1] This conflict continues to displace government resources from other sectors, such as health. In 2014, public investment in health was only 3.6% of the national budget falling short of the Abuja commitment of 15%.[2] As a result of limited government financing to the sector, health services rely heavily on a system of cost recovery through user fees, which may be prohibitive to the majority of the population who live in extreme poverty. The health system has also become dependent on financing from external partners. However, in general, the activities of donors and non-governmental organisations are not well harmonised and coordinated with each other, resulting in the fragmentation and heterogeneity of health services. In addition, various studies have confirmed problems in the supply chains for essential medications and vaccines, poor teaching standards in medical schools and universities, and a general lack of medical personnel due to inadequate workforce-planning.[3]

As a consequence, health indicators in the DRC continue to be amongst the worst globally. According to the 2014 Demographic Health Survey, infant and child mortality rates were 58 and 104 per 1000 live births, respectively.[4] The DRC also languishes at the bottom of the Human Development Index, which uses a measure of life expectancy in its calculation.[5]

Health workers and their revenue in the DRC

The World Health Organization recognises that health workers are one of the core building blocks of country health systems.[6,7] The performance and benefits produced by the health system depend heavily on the knowledge, skills and motivation of its workforce.[8] Health workers are also critically important to the functioning of a health system as they manage and coordinate other important elements, including technology and infrastructure. Neglecting the workforce could therefore result in the waste of these other resources as well as severely hamper the delivery of health services.

Several challenges exist in relation to human resources for health in the DRC. One of these concerns the payment of health workers. Salaries for health workers were nominal following the economic crisis and conflicts during the 1990s. In order to increase wages, occupational risk allowances, or “primes de risque,” were introduced.[9] These allowances are managed by the Ministry of Health while salaries are controlled by the Ministry of Public Sector Reform. This system of dual payment has led to much confusion among health workers around what they should receive from the government, and has important implications for health worker motivation and performance. Moreover, the revenues of health workers have evolved to be “complex”,[10,11] with workers receiving compensation from several alternative sources, including: user fees, informal payments, per-diems and supplements from donors and other non-governmental partners. Many health workers

also supplement their income by engaging in private practice or non-clinical income-generating activities.

Importance of understanding health worker revenue

The income received by health workers has been shown to influence their motivation and performance in the work place.[12,13,14] Given the central role that health workers play with respect to health service delivery, a clear understanding of the amounts and mechanisms by which they are compensated is therefore important. Information on health worker revenues can be used to inform national discussions on health worker salary and health systems policy, and to coordinate the efforts of the government and other partners involved in compensating health workers. A provincial-level analysis will be particularly important in light of decentralisation reforms that transfer more autonomy to provinces.

World Bank study in co-ordination with DFID study

Between October and December 2014, the World Bank carried out a survey on the revenues of health workers in the provinces of Bandundu, Katanga, South Kivu and Equateur. The full results of this study are presented elsewhere.[15] Prior to the implementation of the study, the World Bank was made aware of a DFID-funded study examining health worker revenue which had already been carried out by Tulane University School of Tropical Medicine and Public Health in collaboration with the Kinshasa School of Public Health between March and April 2014. Data had been collected in the provinces of Equateur, Kasai Occidental, Maniema, Province Orientale and Kasai Oriental. Following discussions between the consultants implementing the World Bank study and researchers affiliated with Tulane University, it was ensured that the areas sampled in Equateur for the World Bank study would not overlap with those included in the DFID study. In order to maximise the value of the findings from both studies, where possible, similar data would be collected by the World Bank study that could then be compared to data from the DFID study.

Aim of the report

This short report aims to provide a descriptive comparison of the revenues of health workers in eight provinces in the DRC, using data from the World Bank study and the DFID study. Although the scope and methodology of the two studies are different, presenting similar data derived from these studies together yields a much broader geographical coverage thereby offering a more comprehensive picture of health worker revenues in the DRC.

Objectives

The objectives of this report are to describe provincial-level variation of:

1. The proportion of health workers in health centres receiving the following types of revenue: salaries, primes de risque user fees, per diems, payments from partners, informal payments, and private practice.
2. The average amount received by health workers in health centres for the following types of revenue: salaries, primes de risque, user fees, per diems, payments from partners, and informal payments.
3. The proportion of health workers engaging in income-generating activities which are non-clinical and the amount of income gained from these activities.

Target population

This report concerns the revenues of personnel working in public sector primary care facilities. These included health centres or centres de santé (CS), and reference health centres or centres de santé reference (CSR).

World Bank study

Study design

Data were collected through a quantitative, cross-sectional survey of a sample of health workers at the facility level. Facilities sampled included: health centres or centres de santé, reference health centres or centres de santé reference. Data were also collected from health zone teams, reference hospitals and some private health centres but the analysis of this data is presented elsewhere.[16]

Survey tools

The original survey consisted of two separate questionnaires: (i) an institutional questionnaire administered to one person only per facility/structure, and (ii) an individual questionnaire administered to the individual health workers present in the facility/structure on the day of the survey (see below for choice of respondents within facility). Data collection was carried out using electronic tablets and questionnaires on the Open Data Kit (ODK) Android application. Results included in the joint report draw exclusively from the individual questionnaires. The questionnaire focused on the socio-demographic information of the respondents (sex, age, marital status, province of origin, etc.), their education and career within the health sector, including current post, title and status, as well as the details of the different components of their remunerations. Answers on all incomes were allowed in either US dollars or Francs Congolais (FC), while the recall period depended on the type of question asked, varying from “last amount received” (for salaries, primes de risque, primes de partenaires and user fees), to “last three months” (for per diems) to “last month” (for informal payments, private work and non-clinical

income generating activities). The electronic data collection permitted creating a series of "loops" for some questions which allowed a varying number of answers to be included, for example for per diems which are often received concurrently by health workers. Additionally, for remuneration components considered particularly sensitive, a technique called "unfolding brackets" was applied. The unfolding bracket technique is used in economic studies to reduce missing data in quantitative questions.[17] If a respondent fails or refuses to answer a question, he/she is asked whether the quantity of interest lies above or below a pre-specified level. This question is then pushed further depending on the answer, asking the respondent if the true value lies below or above another value lying in the range indicated in the previous answer.[18]

Sampling strategy

Four provinces were purposefully selected: Bandundu, Katanga, South Kivu, and the southern part of Equateur. In Bandundu and South Kivu, 16 health zones were randomly sampled. Within these 16 health zones, 8 health zones were purposefully chosen based on criteria of logistic feasibility and security. In Equateur, a subset of accessible and safe zones,[i] which were not already sampled by the DFID study, was proposed by the World Bank's Projet d'Appui à la Réhabilitation du Secteur de la Santé (PARSS) team in Mbandaka, and 8 health zones were randomly sampled within them. A drawback of these constraints is that in Equateur, all the selected zones have been receiving support from the PARSS, which limits the generalizability of the findings for Equateur. In Katanga, a subset of health zones distant of less than 400 km from Lubumbashi was used as a sampling frame, and 8 health zones were randomly sampled within them. The sampling approach adopted for zone level sampling was a probability proportional to size (PPS), where the size of the health zone was defined by the number of health facilities in the zone. Within each sampled health zone, 10 health areas were randomly selected, and the 'official' CS or CSR of the health area was included in the survey.

The selection of individual health workers to interview was carried out as follows. Within each CS or CSR with less than 12 qualified staff, all health workers present on the day of the survey (only level A3[ii] and above, if available) were to be interviewed. For facilities with more than 12 qualified staff, a sample of 3 doctors, 3 nurses A0/A1/L2, 2 nurses A2, 2 nurses A1 and 2 administrators were selected. If sufficient staff in the higher cadres was not available, the surveyor could substitute them with health workers in the immediately lower cadre, until the 12 health workers sampling frame was filled. Therefore, a maximum of 12 health workers was to be interviewed in each facility. This selection process was designed to allow each health facility to be surveyed in one workday.

Data collection

Data collection was carried out by the Kinshasa School of Public Health between October 20 and November 14, 2014 in the four provinces, by four teams of ten surveyors and one supervisor. Before the interviews, the research was explained to the health workers who

[i] An Ebola Virus Disease epidemic was ongoing in the ZS of Boende (Equateur) at the time of sampling and data collection.

[ii] A0/L2 level is the most senior level of nurse, followed by A1, then A2, and finally A3. A0/L2 and A1 nurses have attained Post-secondary education while A2 and A3 nurses have attained secondary level education.

were given an information sheet. Informed consent was signed electronically on the tablets.
While 320 CS or CSR were to be surveyed, 288 facilities were included (90%) in total. Most of the facilities not surveyed were excluded for security reasons (in Katanga and South Kivu). Others were excluded based on unavailability of health workers during the day planned for the survey.
The uploaded data was extracted through ODK Briefcase and exported in .csv format. Data was then analysed with the statistical software R. All monetary values were standardized to US dollars. Outliers that seemed implausible or with an order of magnitude difference compared to the next upper value were excluded.

DFID study

Study design

The DFID study on health worker revenues was nested within a larger baseline evaluation of DFID's "appui globale" programme ASSP (Accès aux Soins de Santé Primaires) which is implemented by IMA World Health. ASSP is working in 56 health zones in Equateur, Orientale, Kasai Occidental, Maniema, and South Kivu provinces and its interventions have been designed to strengthen the government's priority pillars as outlined in the National Health Development Plan for the period 2011-2015. Data were collected through a quantitative, cross-sectional survey of a sample of health workers at facility level. Facilities sampled included CS and CSR. Although the ASSP project also supports hospitals, data were not collected from these facilities.

Survey tools

The full evaluation of ASSP involves baseline and end-line survey data collection from households, health facilities and health workers in areas covered by the ASSP programme as well as areas which are not covered by the programme ("control" areas). The results included in this report refer only to data collected on health workers.

A health worker questionnaire was administered to individual health workers present in either the CS or CSR sampled on the day of the survey. The survey was adapted from the Health Worker Incentive Survey[19] and included questions on demographic variables (sex, cadre, qualifications, marital status etc.), and sources and amounts of different types of health worker revenue. Answers on all incomes were in FC, while the recall period depended on the type of question asked, varying from "last month received" for all incomes with the exception of per diems which was asked for the "last year". Health worker income was not the only focus of the questionnaire; items inquiring about levels of supervision, services rendered, health worker motivation and satisfaction were also included but the results are not presented in this report. The questionnaire had been piloted in two health facilities in Kinshasa and one facility in Bas Congo prior to implementation of the baseline evaluation.

Sampling strategy

The sampling of health facilities was determined by the village sampling method for the household survey of the baseline evaluation. This method employed PPS and yielded a total sample of 210 villages. The official CS or CSR designated for serving the administrative health area in which the village was located was then selected. Hospitals and private facilities were not included in the sample. All workers providing clinical services and on duty in these sampled health centres during the baseline evaluation were interviewed. For more detail on the sampling strategy of the impact evaluation of ASSP, please refer to the ASSP baseline protocol.[20]

Data Collection

The Kinshasa School of Public Health (KSPH) in collaboration with Tulane University were contracted to manage the fieldwork for this study. These institutions recruited and trained personnel to: pre-test the survey instruments, supervise the fieldwork, and oversee data entry. Data collection was carried out between April and May 2014 by data collectors hired from each of the provinces to ensure appropriate language skills and familiarity with the cultural context.

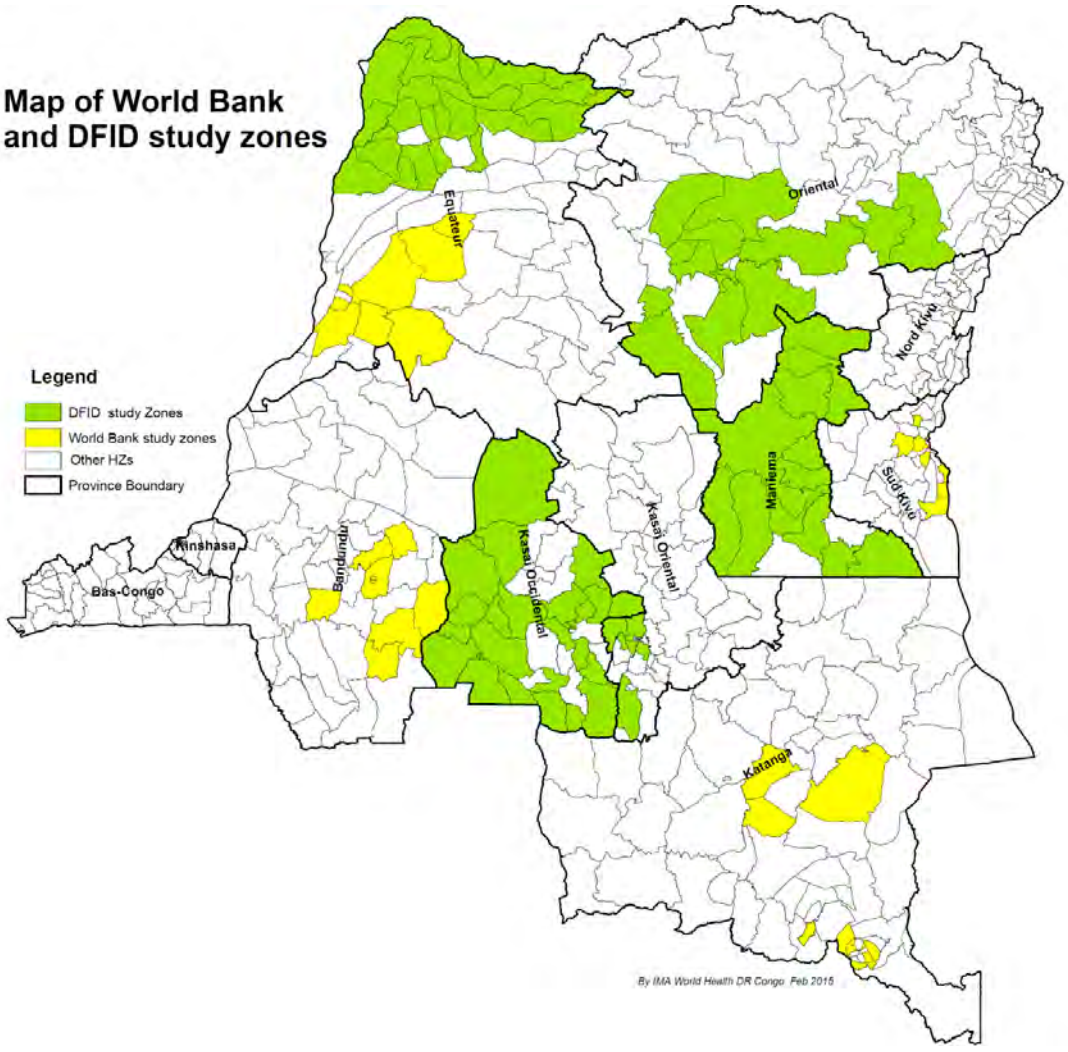
Participation of health workers in the interview was voluntary. To minimise the potential for social desirability bias, the interviewer explained the purpose, confidentiality and anonymity of the study to each provider before seeking consent to begin the interview.

Data collected from the surveys were then double entered into the computer database CSPro for verification and checked for any erroneous values. All data were imported into and analysed in STATA v. 13.0. Outliers which seemed implausible or with an order of magnitude difference compared to the next upper value were excluded.

Health zones sampled for World Bank and DFID study

The map in Figure 1 illustrates the coverage of the two studies by health zone.

Figure 1: Map illustrating health zones sampled by World Bank study and DFID study



Where the two studies sampled the province of Equateur, the World Bank only sampled facilities in the South while the DFID study had sampled facilities in the North. It should be noted that although the DFID study sampled more health zones, the World Bank study sampled more health areas and therefore more facilities within each health zone compared to the DFID study.

Results of World Bank and DFID studies

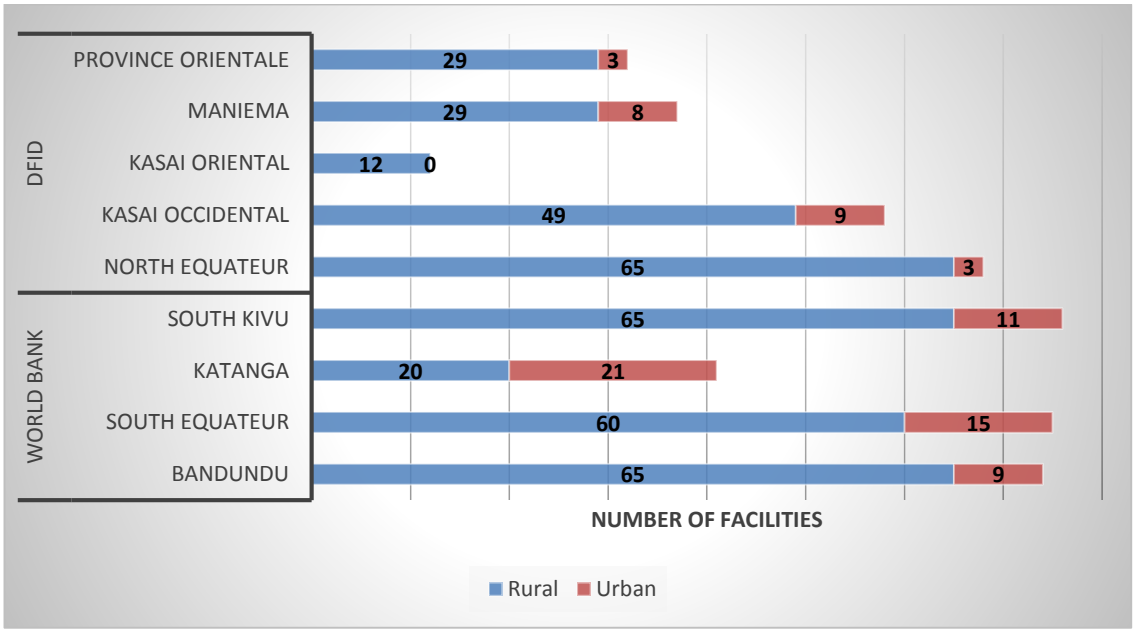
Facilities selected by World Bank and DFID studies

Figure 2 illustrates the number of facilities sampled in each study by province and urban-rural status. Although 210 facilities were sampled by the DFID study, three of these facilities were excluded from the analysis as they were not health centres supported by the state and so did not meet the study inclusion criteria. The uneven number of facilities sampled in provinces of the DFID study were due to the fact that facility survey was designed to be linked to a population-based household survey in the same study areas – as part of a larger impact evaluation of the ASSP programme.

The World Bank study included 288 facilities. However, 22 facilities were excluded from the analysis presented here as they were private facilities. Many of the private facilities which were excluded were in Katanga province. Therefore, in total, 266 state-approved facilities were in the World Bank sample. As shown in Figure 2, the World Bank study sampled overall proportionately more in urban areas compared to the DFID study (21% versus 11% respectively).

In addition, the World Bank sampled proportionately more CSR facilities compared to the DFID study. Twenty-three percent of facilities sampled by the World Bank were CSR compared to only 15% in the DFID study. The number of CS and CSR sampled are given in Table 1.

Figure 2: Number of facilities sampled by study and location



Characteristics of staff interviewed in health facilities

Table 1 and Figure 3 give information on the number of workers interviewed and the proportion of workers identified in each cadre for each province. In total, the World Bank sampled 1,181 workers while the DFID study sampled 485 workers. For the DFID study,

nine respondents were excluded from the analysis as they were working in facilities that did not meet the DFID inclusion criteria, leaving data from 476 workers for the analysis. It can be seen from both Table 1 and Figure 3 that nurses were the most common cadre interviewed in health facilities. Both studies identified very small numbers of personnel for cadres other than nurses in comparison to the number of facilities sampled. On account of the small number of workers in cadres other than nurses, the results in the report will focus predominantly on interpreting results for nurses and total workers. The small numbers of workers in other cadres limit the generalizability of the findings.
In general, a higher proportion of laboratory workers were identified in the World Bank study provinces compared to the DFID study provinces, however, the number of laboratory workers in facilities was still very low. In Kasai Oriental, no laboratory workers were identified, however, the number of facilities sampled from this area was less on account of the sampling strategy. The category "other" included those positions which did not fit into the other cadres specified in the table and were unqualified personnel. In the DFID study they included receptionists, traditional birth attendants and non-qualified personnel conducting clinical activities e.g. nurse assistants or auxiliary staff. Doctors, pharmacy workers and administrators are officially designated to work in hospitals rather than health centres yet some workers in these cadres were still identified by both studies.[21]

The average number of workers per facility was only two in the provinces of North Equateur, Kasai Occidental, Kasai Oriental and Province Orientale. However, in Maniema, Katanga and Bandundu, the health facilities appeared to be better staffed with an average of six personnel per facility.

Table 1: Number of health workers interviewed by cadre, province, and facility

	World Bank study					DFID study			
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occide-ntal**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	9	4	7	12	0	0	0	3	0
Nurse	314	162	157	198	93	127	24	115	52
Lab worker	19	8	21	26	0	2	0	5	2
Doctor	6	5	16	3	0	0	0	4	0
Pharmacy worker	5	10	14	19	0	1	0	0	1
Other	88	11	28	39	11	10	5	9	12
Total number of workers	441	200	243	297	104	140	29	136	67
Number of CS	51	63	24	68	88	114	29	96	54
Number of CSR	23	12	17	8	16	26	0	40	13
Average number of workers per facility	**6**	**3**	**6**	**4**	**2**	**2**	**2**	**4**	**2**

Figure 3: Proportion of different cadres identified in health facilities

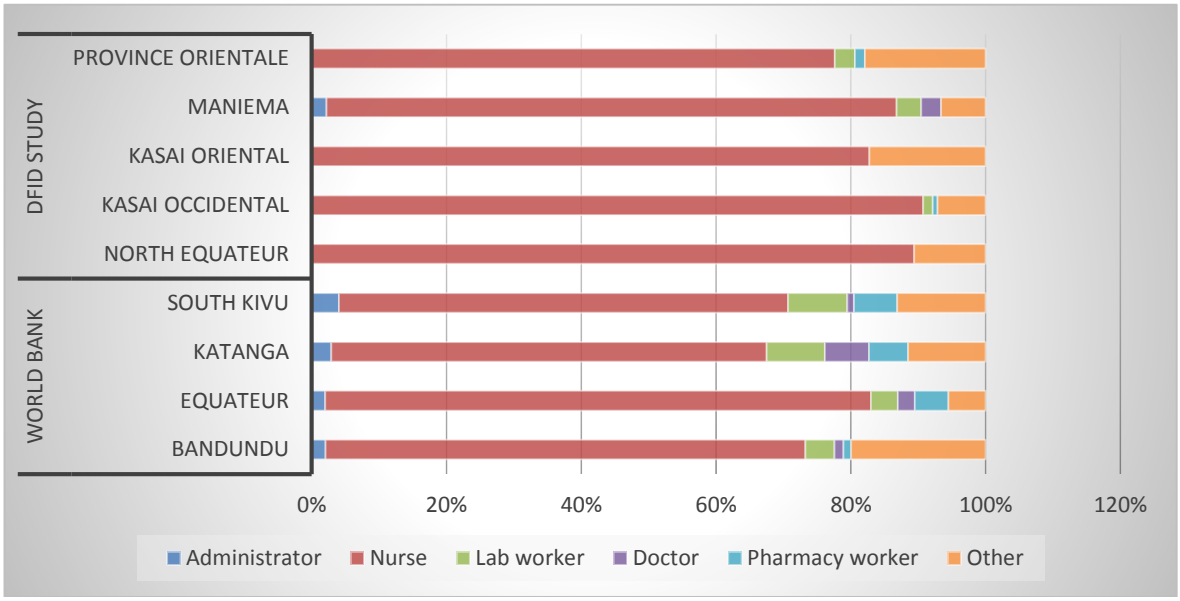
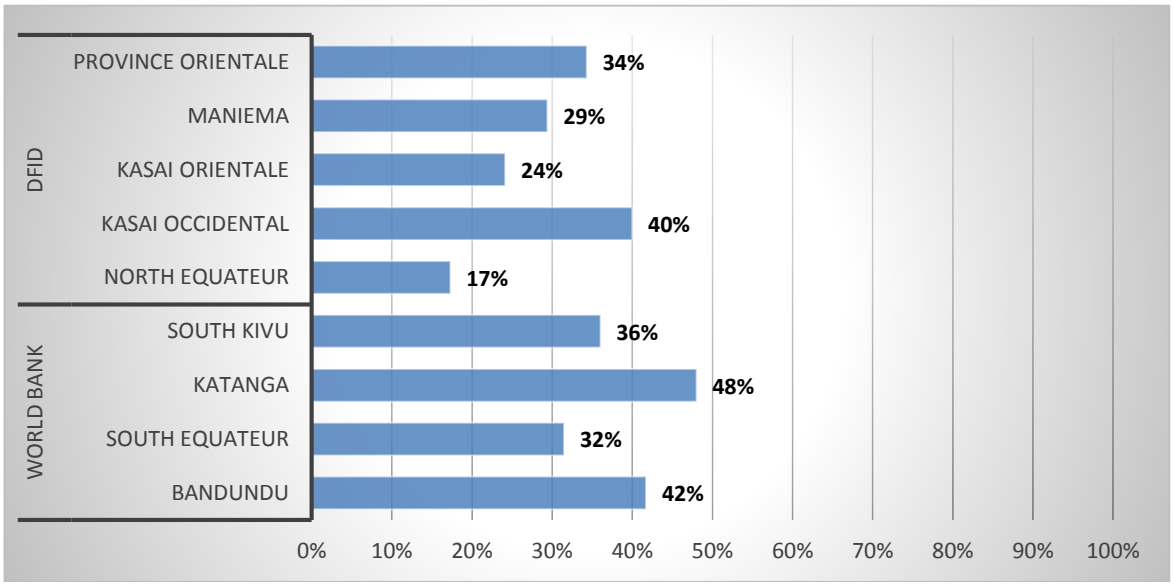


Figure 4 below indicates the proportion of female workers by province for the two studies. Male workers outnumbered female workers in every province. North Equateur had the lowest proportion of female workers at only 17%. However, the gender distribution of workers in Katanga was almost equal, with 48% of health workers being female.

Figure 4: Proportion of female workers in each province



Salaries received by health workers

Table 2 illustrates the proportion of workers in each cadre and province receiving salaries. The proportions in the cells have been displayed as a heatmap in order to facilitate comprehension of the data. In general, there was a lot of variation between the provinces.

For instance, 40% of nurses reported receiving salaries in Kasai Occidental compared with only 7% in South Kivu.

Table 2: Proportion of workers receiving state salaries

Worker Cadre	World Bank study				DFID study				
	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	0.0%	0.0%	28.6%	8.3%	NA	NA	NA	0.0%	NA
Nurse	11.5%	22.8%	24.8%	6.6%	26.9%	40.2%	29.2%	20.0%	36.5%
Lab worker	10.5%	0.0%	42.9%	3.9%	NA	50.0%	NA	0.0%	100.0%
Doctor	16.7%	0.0%	37.5%	0.0%	NA	NA	NA	25.0%	NA
Pharmacy worker	0.0%	20.0%	42.9%	0.0%	NA	0.0%	NA	NA	0.0%
Other	12.5%	18.2%	28.6%	0.0%	63.6%	20.0%	40.0%	0.0%	25.0%
Total number of workers	441	200	243	297	104	140	29	136	67

NA: Not applicable as no health workers in those categories were identified

0% 50% 100%

Figure 5 indicates the overall proportion of workers for each province receiving a salary. Again, provincial variation was high with workers less likely to receive salaries if they were in South Kivu (5%) compared to Kasai Occidental (39%).

Figure 5: Overall proportion of workers interviewed receiving salary

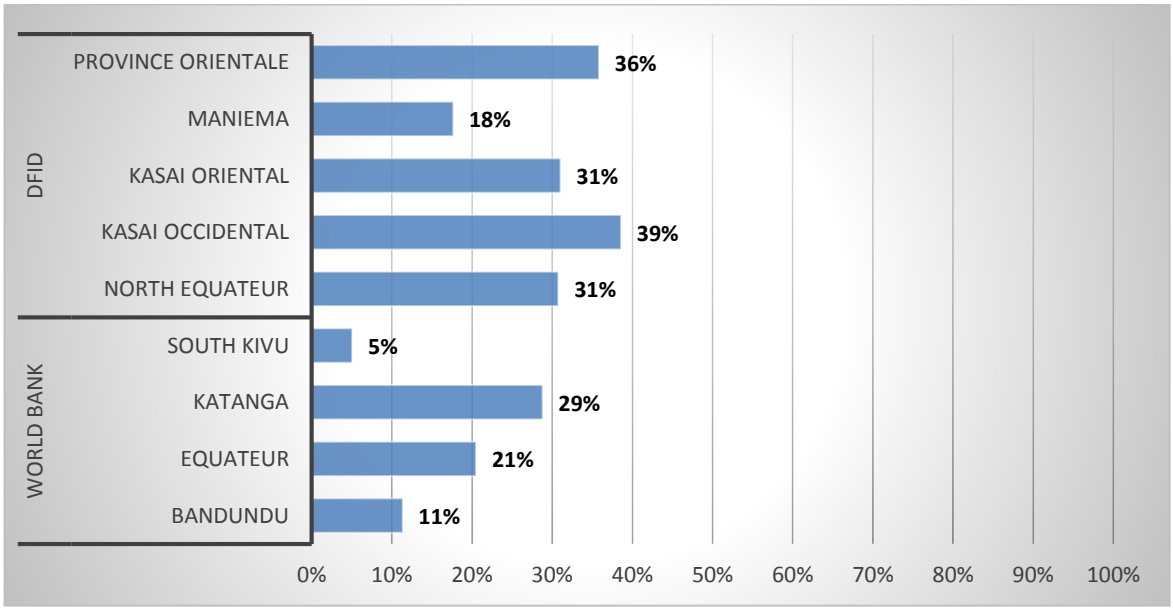


Table 3 illustrates the average[iii] amount of salary earned by each cadre each month in $US.[iv] In general, workers in Katanga were higher paid compared to workers in any of

[iii] World Bank supplied data as averages (raw data from the World Bank study was not available to the author).

[iv] For all income calculations, a conversion rate of 923 FC to $1 was applied to convert FC to $US where necessary.

the other provinces. Nurses earned $34 on average in Province Orientale to $173 in Katanga. There was a lot of variation in the average payment of other specified cadres.

Table 3: Average amount of monthly salary earned by workers (amounts in $US)

	World Bank study				DFID study				
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occid-ental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	NA	NA	93.17	89.60	NA	NA	NA	NA	NA
Nurse	91.99	75.27	172.81	76.21	63.41	45.02	78.01	92.42	34.04
Lab worker	71.84	NA	131.42	73.67	NA	65.00	NA	NA	232.39
Doctor	75.84	NA	311.92	NA	NA	NA	NA	59.59	NA
Pharmacy worker	NA	74.27	235.03	NA	NA	NA	NA	NA	NA
Other	73.76	41.53	127.57	NA	26.78	32.23	30.34	NA	20.22
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

Primes de risque received by health workers

Table 4 illustrates the proportion of workers by cadre and province receiving a prime de risque. Again, there was a lot of variation within studies and between the studies for each cadre. For instance, 29% of nurses received a prime de risque in Kasai Oriental compared with 71% of workers interviewed in Province Orientale. In all other provinces, the proportion of nurses receiving a prime de risque varied between 32% and 61%.

Table 4: Proportion of workers receiving a prime de risque

	World Bank study				*DFID study*				
Worker Cadre	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	0.0%	25.0%	14.3%	66.7%	NA	NA	NA	33.3%	NA
Nurse	43.3%	42.6%	40.8%	54.0%	59.1%	32.3%	29.2%	61.7%	71.2%
Lab worker	26.3%	12.5%	23.8%	50.0%	NA	0.0%	NA	40.0%	100.0%
Doctor	33.3%	100.0%	43.8%	66.7%	NA	NA	NA	25.0%	NA
Pharmacy worker	0.0%	50.0%	28.6%	68.4%	NA	0.0%	NA	NA	0.0%
Other	20.5%	27.3%	28.6%	41.0%	27.3%	30.0%	20.0%	22.2%	50.0%
Total number of workers	441	200	243	297	104	140	29	136	67

NA: Not applicable as no health workers in those categories were identified

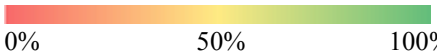
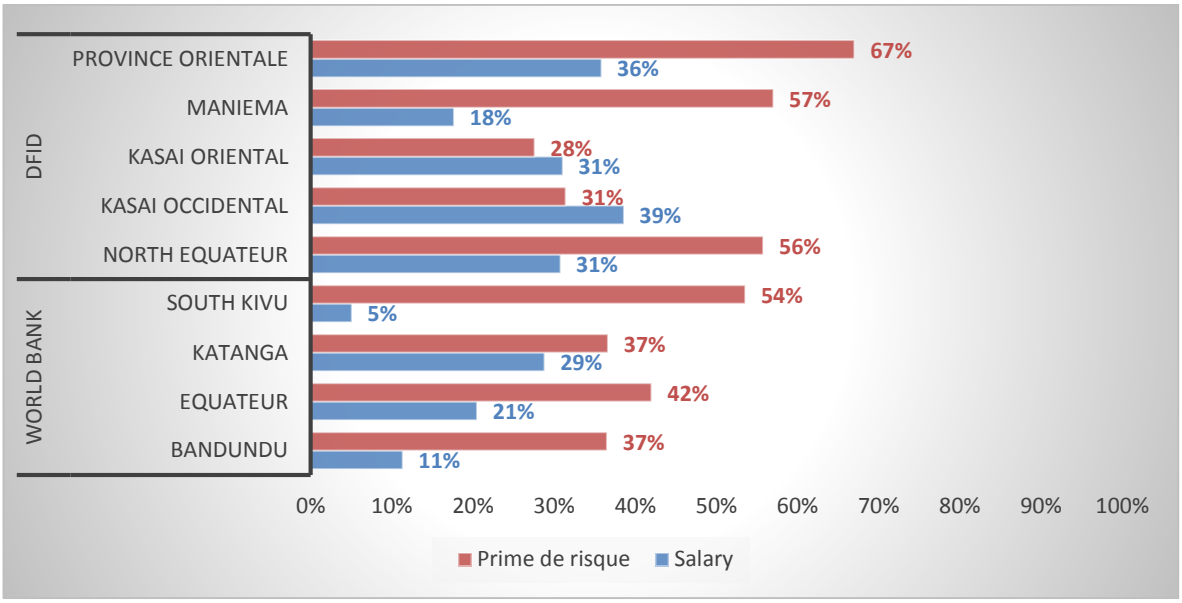


Figure 6: Proportion of workers receiving salaries or a prime de risque



In general, as illustrated in Figure 6, primes de risque were either as often or more often received than salaries, the exception being in provinces Kasai Occidental and Kasai Oriental.

Table 5 below illustrates the average amount of prime de risque earned by each cadre each month in $US. Nurses could earn an average of $13 in Katanga and $72 in North Equateur. Doctors in Maniema could earn $546 on average but were earning only $98 on average in Katanga, although these figures are based on a small number of doctors in each province.

Table 5: Average amount of monthly prime de risque earned by workers (amounts in $US)

	World Bank study					DFID study			
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	NA	43.07	21.67	13.83	NA	NA	NA	10.29	NA
Nurse	15.77	19.54	13.63	14.78	71.88	46.20	30.45	15.87	18.39
Lab worker	11.22	21.67	20.21	17.58	NA	NA	NA	14.98	22.86
Doctor	NA	NA	97.51	NA	NA	NA	NA	546.05	NA
Pharmacy worker	NA	20.26	12.80	12.63	NA	NA	NA	NA	NA
Other	16.58	22.84	18.09	12.55	12.55	10.47	39.00	11.92	37.38
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

User fees or "prime locale" received by health workers

Overall, the proportion of workers receiving revenue from user fees was high, as can be seen in Figure 7. This indicated that most workers received their income from the facility.

Figure 7: Proportion of workers receiving user fees

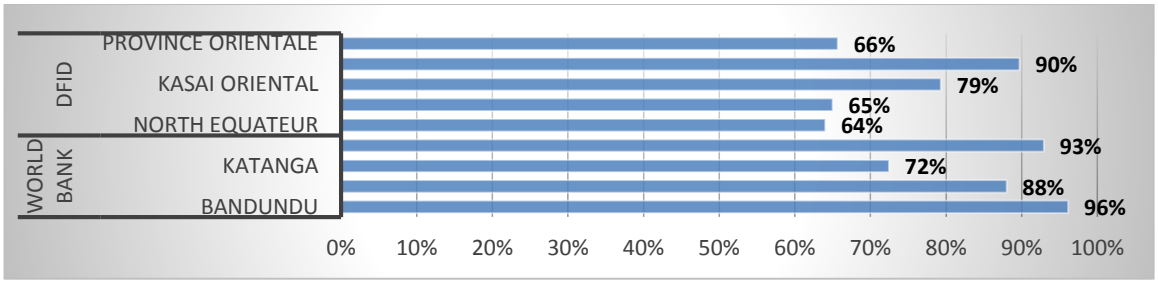


Table 6 indicates the proportions of workers receiving user fees for each worker category. In Maniema, most cadres profited from user fees. In South Kivu and Bandundu, over 90% of nurses received income from user fees.

Table 6: Proportion of workers receiving income from user fees by worker cadre

	World Bank study				DFID study				
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	88.9%	75.0%	57.1%	91.7%	NA	NA	NA	100.0%	NA
Nurse	97.1%	89.5%	74.5%	93.4%	67.7%	65.4%	83.3%	87.8%	71.2%
Lab worker	94.7%	87.5%	71.4%	80.8%	NA	50.0%	NA	100.0%	100.0%
Doctor	66.7%	100.0%	56.3%	100.0%	NA	NA	NA	100.0%	NA
Pharmacy worker	100.0%	80.0%	57.1%	100.0%	NA	0.0%	NA	NA	100.0%
Other	95.5%	72.7%	82.1%	94.9%	27.3%	70.0%	60.0%	100.0%	33.3%
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no health workers in those categories were identified

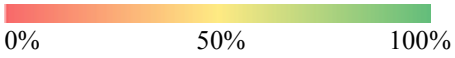


Table 7 illustrates the income earned by workers from user fees in the past month. There was a quite a lot of variation observed between cadres; for example, nurses in Maniema made on average $15 from user fees a month while nurses in North Equateur made $190. This result was driven by some nurses receiving a very high income from user fees in this province. Doctors appeared to make the most; in South Kivu they made on average $213 from user fees.

Table 7: Monthly income from user fees earned by workers (amounts in $US)

	World Bank study					DFID study			
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	66.26	52.00	42.57	124.92	NA	NA	NA	23.11	NA
Nurse	21.21	19.14	47.87	68.89	190.55	76.68	46.88	15.04	19.75
Lab worker	29.41	24.38	39.72	63.17	NA	91.01	NA	18.20	264.36
Doctor	140.44	148.81	68.47	213.33	NA	NA	NA	120.53	NA
Pharmacy worker	31.53	12.93	26.68	50.49	NA	NA	NA	NA	5.42
Other	11.32	8.44	111.52	39.59	90.65	29.02	60.67	5.92	30.34
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

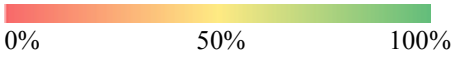
Income from per diems

Workers in both studies were asked whether they received per diems. However, the recall periods for the two studies were different; the World Bank asked whether workers had received per diems in the past three months while the DFID study asked whether workers had received per diems in the past year. Amounts were then standardized by month. For the DFID study, it can be seen that nurses, doctors, lab workers and pharmacy workers were more likely to receive per diems compared to those in the "other" category. For the World Bank study, there was a lot of variation between provinces for the "other" category; 21% received per diems in Katanga while 90% received per diems in Bandundu.

Table 8: Proportion of workers receiving per diems by worker cadre

	World Bank study				*DFID study*				
Worker Cadre	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	44.4%	0.0%	28.6%	25.0%	NA	NA	NA	0.0%	NA
Nurse	95.5%	65.4%	58.6%	67.7%	64.5%	59.1%	50.0%	40.0%	38.5%
Lab worker	84.2%	75.0%	52.4%	50.0%	NA	0.0%	NA	0.0%	100.0%
Doctor	50.0%	40.0%	56.3%	66.7%	NA	NA	NA	75.0%	NA
Pharmacy worker	100.0%	50.0%	21.4%	63.2%	NA	NA	0.0%	NA	0.0%
Other	89.8%	72.7%	21.4%	53.8%	27.3%	10.0%	0.0%	0.0%	16.7%
Total number of workers	441	200	243	297	104	140	29	136	67

NA: Not applicable as no health workers in those categories were identified



In general, the average amount received per month in per diems was not very high; the maximum amount earned on average was almost $33 per month. Where doctors were identified in the facilities as receiving per diems, they usually earned the most compared to other cadres.

Table 9: Monthly income from per diems earned by workers (amounts in $US)

	World Bank study					DFID study			
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	5.00	NA	11.53	3.13	NA	NA	NA	NA	NA
Nurse	7.40	7.30	9.11	10.22	17.04	5.45	4.03	5.43	4.02
Lab worker	3.91	32.99	13.73	4.15	NA	NA	NA	NA	2.44
Doctor	18.78	28.33	13.42	16.67	NA	NA	NA	15.17	NA
Pharmacy worker	6.29	3.46	4.93	6.79	NA	NA	NA	NA	NA
Other	4.71	4.24	14.21	5.73	2.56	3.16	NA	NA	1.22
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

Income from informal payments

In both studies, workers were asked whether they received informal payments or "cadeaux" (gifts) from patients which were not part of the user fee. However, given the sensitivity of this question, the World Bank used a method called "unfolding brackets" to reduce non-response; this method was not employed by the DFID study. The higher proportion of health workers admitting informal payments and higher amounts declared found in the World Bank study are likely to be due to the different methods of questioning used. The results show that only 8% of nurses in North Equateur reported receiving informal payments compared to 76% of nurses in Bandundu. Figure 8 shows that, with the exception of Bandundu, less than 50% of workers overall in all other sampled provinces reported receiving any informal payments. There was also a lot of provincial-level variation in the proportion of workers reporting receiving this revenue.

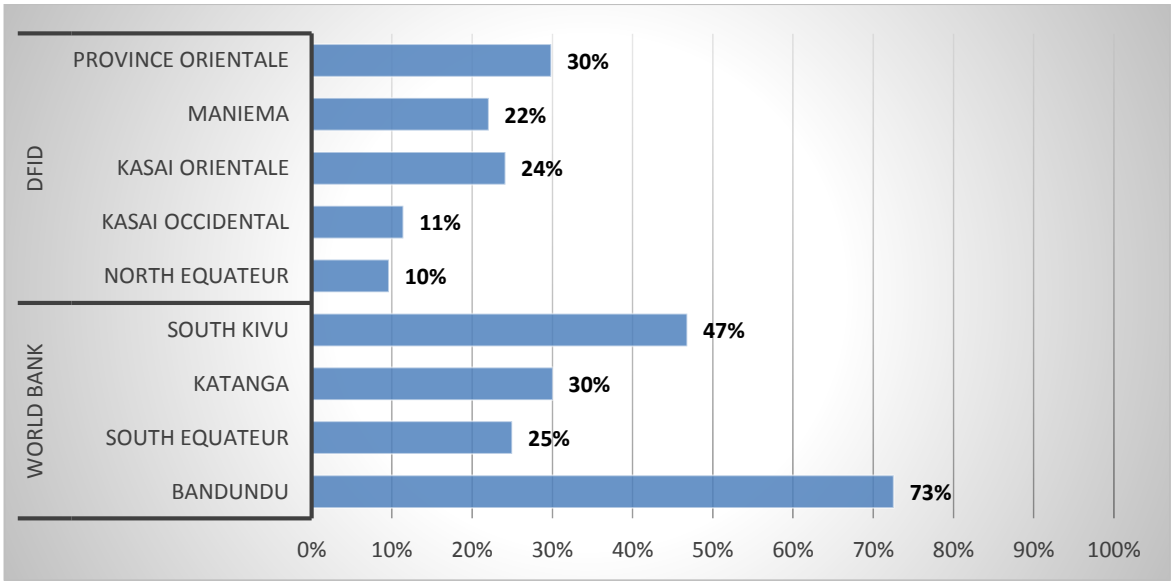
Table 10: Proportion of workers receiving informal payments in last month by worker cadre

Worker Cadre	World Bank study				DFID study				
	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	11.1%	25.0%	57.1%	41.7%	NA	NA	NA	33.3%	NA
Nurse	76.4%	26.5%	34.4%	55.1%	7.5%	11.0%	20.8%	24.3%	26.9%
Lab worker	78.9%	25.0%	28.6%	38.5%	NA	0.0%	NA	0.0%	50.0%
Doctor	50.0%	40.0%	12.5%	66.7%	NA	NA	NA	25.0%	NA
Pharmacy worker	60.0%	20.0%	14.3%	26.3%	NA	NA	NA	NA	100.0%
Other	65.9%	0.0%	17.9%	20.5%	27.3%	20.0%	40.0%	0.0%	33.3%
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no health workers in those categories were identified

0% 50% 100%

Figure 8: Proportion of workers receiving informal payments



Workers admitting to informal payments in general received low amounts. However, doctors again seemed to receive the highest amounts of informal payments, with some reporting receiving up to $253 on average in Katanga.

Table 11: Monthly income from informal payments earned by workers (amounts in $US)

	World Bank study					DFID study			
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	0.13	48.75	12.27	2.41	NA	NA	NA	24.38	NA
Nurse	9.60	8.04	17.60	5.33	16.87	11.85	3.03	7.60	5.02
Lab worker	3.99	7.40	8.89	6.28	NA	NA	NA	NA	0.98
Doctor	19.11	188.52	252.71	7.71	NA	NA	NA	54.17	NA
Pharmacy worker	7.62	27.36	14.63	2.35	NA	NA	NA	NA	1.08
Other	11.35	NA	7.40	5.23	27.30	7.04	13.54	NA	4.33
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

Income from private practice

Private practice was conducted by a minority of workers in all provinces. In Katanga, just over one fourth of workers reported working privately while between 0 and 4% worked privately in Kasai Oriental, Province Orientale, North Equateur, South Kivu and Bandundu. Amounts of revenue received are not presented here given the very small numbers receiving income from this source.

Figure 9: Proportion of workers in each province reporting private medical practice

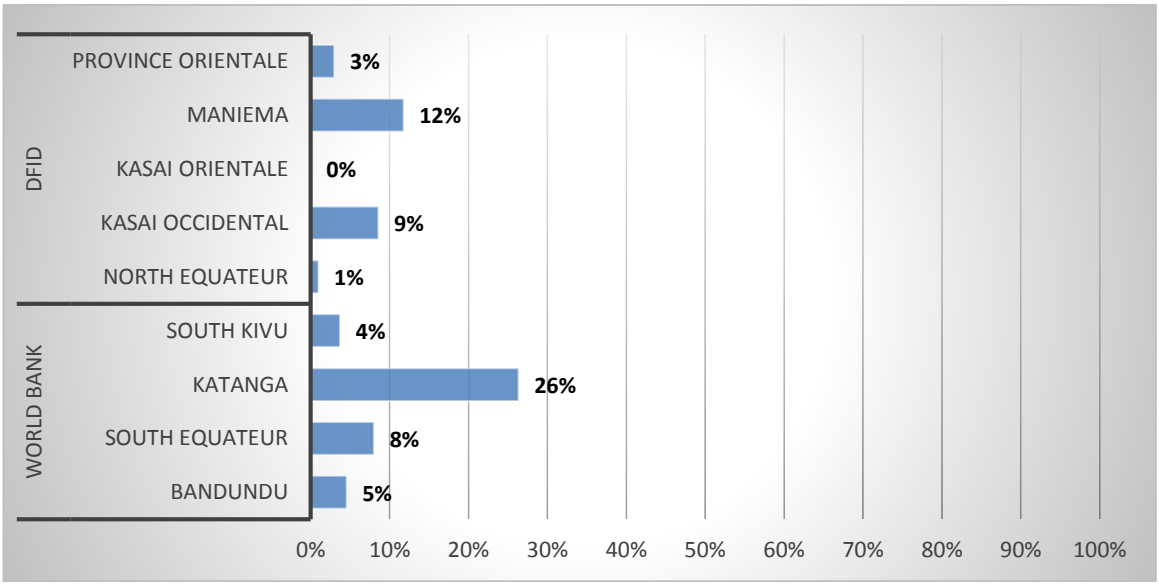


Table 12 also indicates the prevalence of private practice across cadres for the two studies. It indicates that private clinical work was not conducted by all cadres in each province, with the exception of in Katanga. Particularly in the DFID study, private practice was reported very rarely and not at all in Kasai Orientale. The large proportion for lab workers in Maniema and Province Orientale, however, should be interpreted with caution as very few workers were identified in this category.

Table 12: Proportion of workers engaging in private work by worker cadre

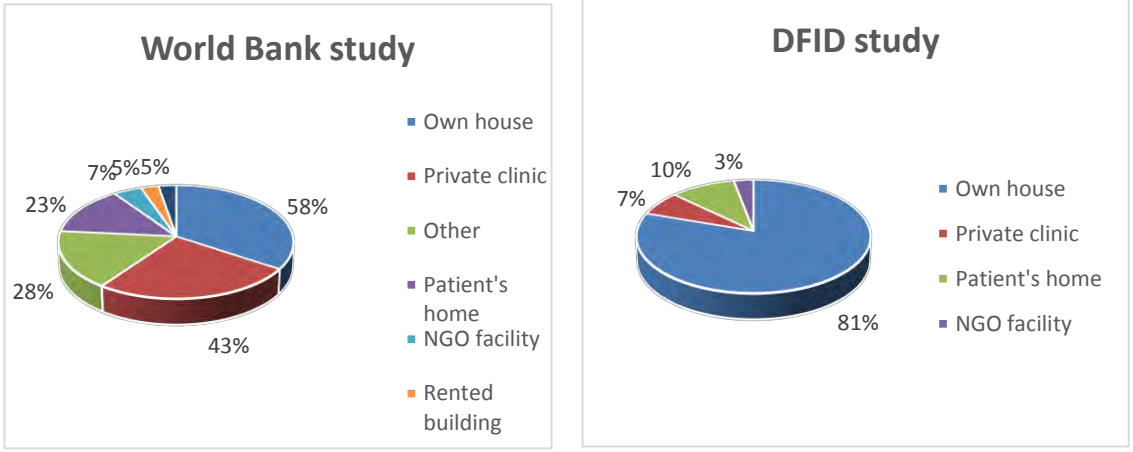
Worker Cadre	World Bank study				DFID study				
	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	0.0%	0.0%	42.9%	0.0%	NA	NA	NA	0.0%	NA
Nurse	5.1%	9.3%	28.0%	4.0%	1.1%	9.4%	0.0%	13.0%	1.9%
Lab worker	5.3%	12.5%	19.1%	3.9%	NA	0.0%	NA	20.0%	50.0%
Doctor	16.7%	0.0%	37.5%	33.3%	NA	NA	NA	0.0%	NA
Pharmacy worker	0.0%	0.0%	21.4%	0.0%	NA	0.0%	NA	NA	0.0%
Other	2.3%	0.0%	14.3%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%
Total number of workers	441	200	243	297	104	140	29	136	67

NA: Not applicable as no health workers in those categories were identified

0% 50% 100%

The pie charts in Figure 10 below compare the location of private practice between the two studies. The results have been aggregated across the two studies on account of the small number reporting private practice. It can be seen that for both studies, those workers engaging in private practice mainly delivered this in their own home, the patient's home or a private clinic.

Figure 10: Location of private practice in the World Bank and DFID study (% of all workers conducting private practice)



Income from performance primes or "primes des partenaires"

Overall, as can be seen in Figure 11, Maniema had the highest proportion of workers overall receiving performance payments at 56%. This was closely followed by South Kivu and South Equateur (both 55%). The lowest proportions of workers receiving partner primes were in Equateur (11%) and Kasai Occidental (12%).

Figure 11: Proportion of workers in each province receiving a performance prime

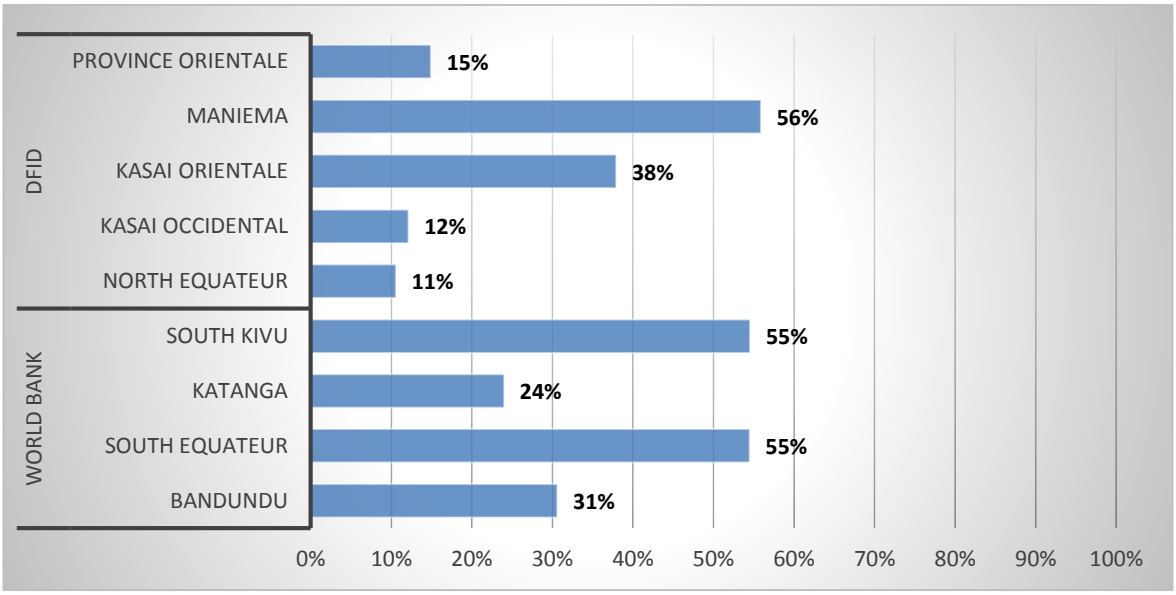


Table 13: Proportion of workers receiving payments from partners by worker cadre

	World Bank study				*DFID study*				
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	22.2%	75.0%	14.3%	41.7%	NA	NA	NA	66.7%	NA
Nurse	32.8%	57.4%	24.8%	55.1%	11.8%	11.0%	37.5%	51.3%	13.5%
Lab worker	26.3%	50.0%	28.6%	61.5%	NA	0.0%	NA	100.0%	0.0%
Doctor	0.0%	80.0%	18.8%	66.7%	NA	NA	NA	75.0%	NA
Pharmacy worker	20.0%	30.0%	14.3%	52.6%	NA	100.0%	NA	NA	0.0%
Other	27.2%	18.2%	21.4%	51.3%	0.0%	20.0%	40.0%	77.8%	25.0%
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no health workers in those categories were identified

0% 50% 100%

When looking at the amounts received by workers from partners, doctors seemed to consistently be paid more within each province compared to other cadres. In addition, the amounts gained on average could be much higher on average than either a salary or a prime de risque for certain workers, such as doctors in Katanga and nurses in Kasai Occidental.

Table 14: Monthly income from performance payments earned by workers (amounts in $US)

	World Bank study					DFID study			
Worker Cadre	**Bandundu**	**South Equateur**	**Katanga**	**South Kivu**	**North Equateur**	**Kasai Occidental**	**Kasai Oriental**	**Maniema**	**Province Orientale**
Administrator	7.71	6.10	97.51	12.88	NA	NA	NA	9.21	NA
Nurse	10.38	24.07	67.75	33.23	67.22	55.91	84.30	18.86	25.42
Lab worker	6.81	11.91	26.82	21.16	NA	NA	NA	17.33	NA
Doctor	NA	46.45	360.02	20.42	NA	NA	NA	99.36	NA
Pharmacy worker	5.00	7.95	26.50	17.89	NA	5.42	NA	NA	NA
Other	8.79	30.10	363.06	35.55	NA	4.60	61.76	9.38	7.66
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

Supplemental income gained by health workers from non-health activities

Types of income-generating activities practiced were fairly similar across the two studies. According to the pie charts below in Figure 12, the majority of workers gained supplemental income from keeping livestock, hunting or agricultural activities. The second most common source of income identified by both studies was income derived from trade or commerce. Teaching or renting of property was much less practiced. In the World Bank study, a small number of workers chose not to report how they gained any extra income outside the health facility.

Figure 12: Sources of supplemental income for workers in the DFID and World Bank study (% of workers conducting non-clinical activities)

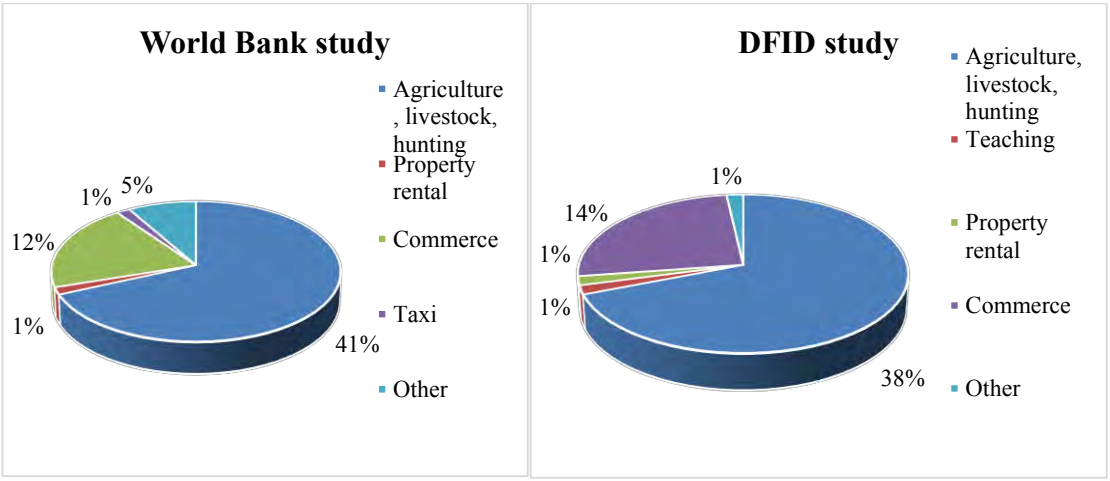


Table 15 illustrates the proportion of workers engaging in any supplemental activity by cadre in each of the sampled provinces. There does not appear to be any discernible pattern between cadres engaging in supplemental activity.

Table 15: Proportion of workers engaging in supplemental income activities by worker cadre

	World Bank study				DFID study				
Worker Cadre	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	44.4%	0.0%	42.9%	58.3%	NA	NA	NA	66.7%	NA
Nurse	53.2%	45.1%	65.6%	48.0%	29.0%	23.6%	20.8%	49.6%	55.8%
Lab worker	36.8%	12.5%	81.0%	50.0%		0.0%		20.0%	50.0%
Doctor	0.0%	20.0%	43.8%	66.7%	NA	NA	NA	0.0%	NA
Pharmacy worker	40.0%	60.0%	71.4%	42.1%	NA	0.0%	NA	NA	100.0%
Other	75.0%	18.2%	39.3%	43.6%	18.2%	10.0%	40.0%	77.8%	50.0%
Total number of workers	441	200	243	297	104	140	29	136	67

NA: Not applicable as no health workers in those categories were identified

0% 50% 100%

It can be seen from Table 16 that a substantial amount of revenue can be derived from supplemental activities. Revenue was particularly high amongst doctors and nurses in Katanga, and doctors in South Equateur.

Table 16: Monthly income from supplemental activities (amounts in $US)

	World Bank study				DFID study				
Worker Cadre	Bandundu	South Equateur	Katanga	South Kivu	North Equateur	Kasai Occidental	Kasai Oriental	Maniema	Province Orientale
Administrator	76.92	NA	65.01	198.11	NA	NA	NA	18.06	NA
Nurse	52.23	61.87	200.73	76.55	46.13	37.50	14.36	21.00	128.81
Lab worker	89.88	48.75	120.70	45.12	NA	NA	NA	9.75	13.84
Doctor	NA	379.20	333.87	131.59	NA	NA	NA	NA	NA
Pharmacy worker	31.50	105.39	83.99	76.91	NA	NA	NA	NA	4.88
Other	47.97	29.79	147.95	66.89	3.15	9.75	165.50	45.38	34.76
Total number of workers	**441**	**200**	**243**	**297**	**104**	**140**	**29**	**136**	**67**

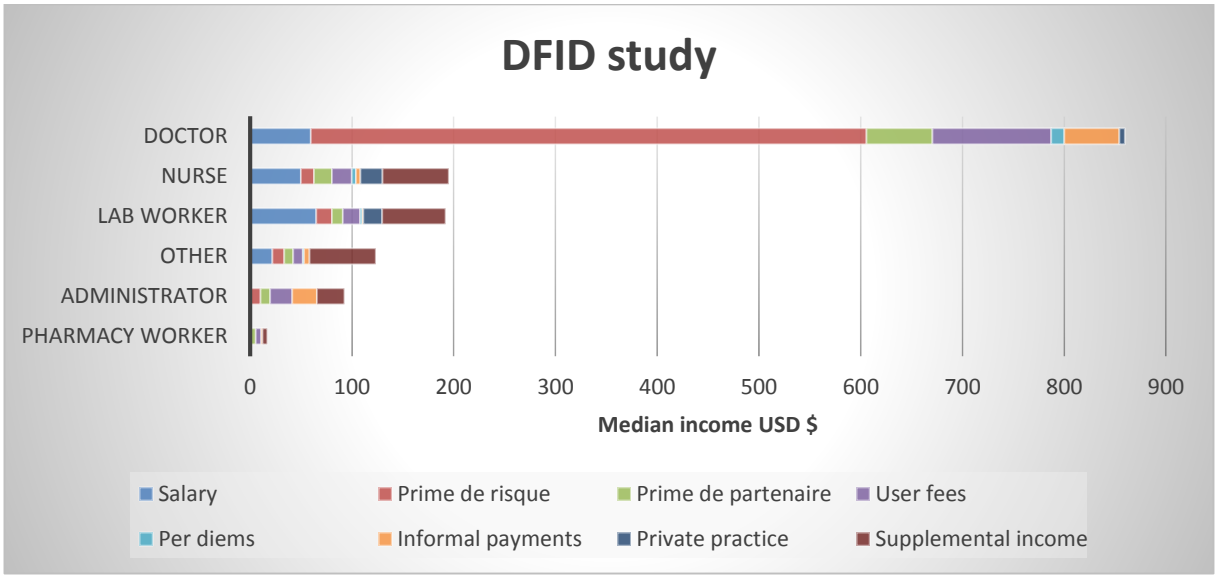
NA: Not applicable as no workers in those cadres identified as receiving salaries or no workers identified in those cadres

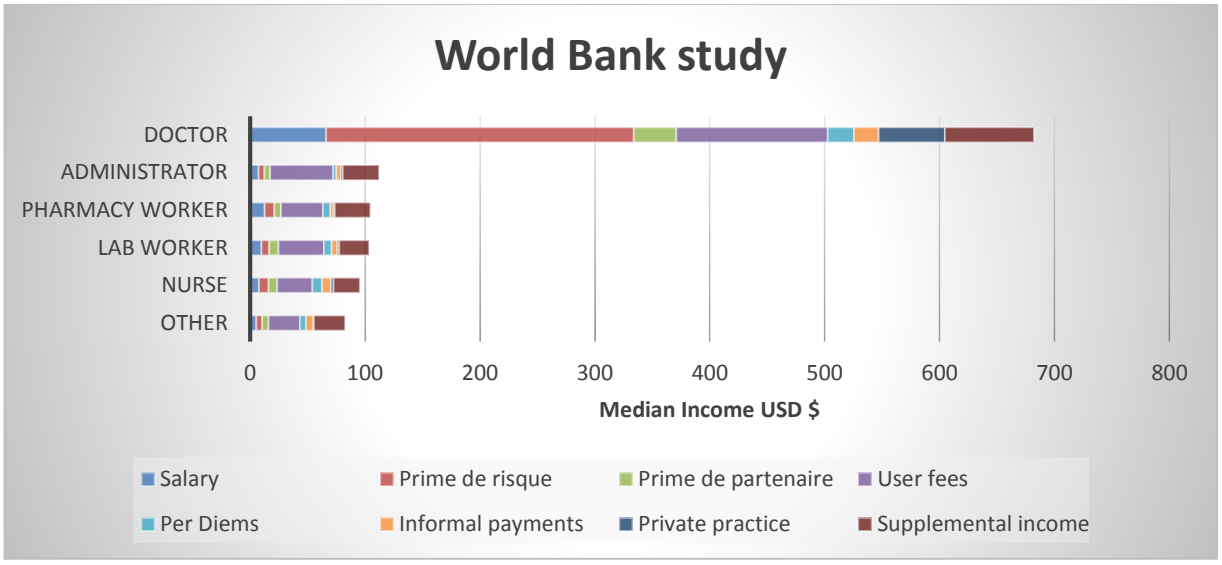
Figure 13 illustrates the total income of each health worker by cadre and aggregated across both the DFID study and the World Bank study. Table 17 also indicates the proportion of each income within the total revenue. Median values as opposed to mean values have been used to calculate the proportions in Table 17 and Figure 13.

It can be seen from Figure 13 that doctors clearly earn more than any other health worker cadre in health centres. Doctor's salaries seem to be several times higher than the salaries received by other cadres. Table 17 also indicates that most workers across all cadres in both the DFID and World Bank study gained a substantial portion of their income from

supplemental non-health activities. User fees appeared to make up the majority of income for most cadres (with the exception of doctors) in the World Bank study.

Figure 13: Annual median amounts for components of income for cadres in DFID and World Bank study





***NB: Using the median value**

Table 17: Proportion of each income in contribution to total income by cadre

	DFID study				
Worker Cadre	**Government**	**Partners**	**User fees**	**Exterior**	**Informal payments**
Administrator	11%	10%	23%	**29%**	26%
Nurse	33%	11%	10%	**45%**	2%
Lab worker	34%	8%	10%	**48%**	1%
Doctor	**70%**	9%	14%	1%	6%
Pharmacy worker	0%	**32%**	**32%**	29%	6%
Other	30%	9%	8%	**58%**	5%

	World Bank study				
	Government	**Partners**	**User fees**	**Exterior**	**Informal payments**
Administrator	11%	7%	**49%**	30%	3%
Nurse	17%	17%	**32%**	26%	8%
Lab worker	16%	14%	**38%**	27%	5%
Doctor	**49%**	9%	19%	20%	3%
Pharmacy worker	20%	12%	**35%**	31%	3%
Other	13%	13%	33%	**34%**	8%

Main source of income in bold

Government: includes salary and prime de risque
Partners: includes per diems and primes des partenaires
User fees: income from user fees
Exterior: includes private practice and supplemental income activities
Informal payments: income from informal payments

Discussion

Although there has been anecdotal evidence on the variation of health worker incomes in the DRC, this report is one of the first to attempt to quantify the extent of this variation. Both studies found that incomes of health workers are made up of a variety of sources and revenues. Indeed, remunerations from governmental sources, such as salary and prime de risque, are received by a minority of health workers and often do not constitute a substantial source of their overall income. Additionally, revenues from external partners, such as per diems and primes des partenaires can be a significant source of income for a number of health workers, although there is much variability between provinces and between individual workers. Overall, incomes such as user fees from patients and activities outside of the health sector emerge as an important source of revenue across cadres and provinces. This highlights the importance of reflecting not only on the formal and relatively well-known sources of incomes, but also on all other components of what is termed the 'complex' remuneration of health workers.[22] Further analytical work to examine the causes at individual, facility and provincial level of the differences between health workers, both in terms of overall income and for each component, is necessary to better understand their incentives, motivation and performance. For some reflections on this, see the full reports for the DFID and World Bank studies.[23,24]

The most recent standards issued by the DRC Ministry of Health specify that health centres should be staffed by at least four nurses, a lab technician, a receptionist and a maintenance worker.[25] Given the number of facilities sampled, the results indicate very few laboratory workers were interviewed; this may be because they were not present the day of the survey or that there is a dearth of laboratory workers in health centres for both studies. The World Bank study did also sample more CSR than the DFID study. These higher level facilities would be expected to have more staff than a CS, which may partly account for the differences in the number of personnel interviewed in each study. However, the majority of staff interviewed in CS or CSR were nurses which is consistent with Ministry of Health standards. It is interesting to note that cadres that are not specified to work in CS or CSR were also detected in these facilities; this finding suggests that there is poor management and deployment of the current workforce. In addition, a large number of workers in both studies belonged to the "other" category which tended to be composed of non-qualified personnel, suggesting a fair proportion of the primary healthcare workforce may lack the necessary skills to deliver quality care. There also appears to be some provincial variation in the staffing of facilities; there tended to be more workers present on the day of the survey in Katanga and Bandundu compared to any of the other provinces sampled. Nonetheless, the overall low number of workers per facility seems to indicate that facilities are not overstaffed, somewhat contrary to some anecdotal reports. This may be because the majority of facilities sampled were in rural areas, and that the overstaffing may be more of an issue in urban areas.

The higher frequency of male workers compared to female workers in all provinces is not surprising and may reflect the on-going disparity in access to education; according to the 2010 Multiple Indicator Cluster Survey, the gender parity index for secondary school is 0.81, indicating that less girls than boys attend secondary school.[26] As a result, females are less likely to become health workers as it requires them to reach attain a certain level of education.

Overall, the proportion of workers receiving salaries was low across all provinces. This could be explained by several factors. Firstly, many workers qualifying after 2006 would not have been registered onto the payroll as this was the last time a full census of health workers was conducted to update the payroll.[27] Secondly, the process for being recruited or "affecté" for a health post by the Ministry of Public Reform in Kinshasa is long and bureaucratic lasting several months, and in some cases, several years. Consequently, many qualified workers are recruited locally by the province rather than in Kinshasa in order to bypass this lengthy process. However, workers recruited directly by the province will not be added to the payroll to receive a salary. In addition, salaries continue to be disbursed to many workers who are now of retirement age. These workers are not being removed from the payroll as there is currently no pension system in existence. Within the already constrained health budget it therefore becomes difficult to pay for any new employees or "nouvelles unités".

More workers appeared to receive a prime de risque compared to a salary. Although these are both government payments, they are not overseen by the same Ministry; salaries are controlled by the Ministry of Public Reform which holds the payroll while the prime de

risque is issued using the declarative list or "liste déclarative" controlled by the Ministry of Health. These lists are not identical, and the different budgetary rules and the complex, political dynamics behind those lists may explain the differences observed between the proportions receiving salaries and primes in each province. In addition, the "liste déclarative" is more regularly updated that the payroll which may account for the higher proportion of workers receiving primes de risque.

In general, the amount of money gained from a salary seemed to be more than that gained from the prime de risque, with one or two exceptions. However, across all provinces the average amount received for either salaries or primes de risque was highly variable. This may have been influenced by the grade and experience of the respondent in each cadre; in general, A0 nurses should earn more than A3 nurses, as they are more highly qualified. In addition, although all workers interviewed receive their salary payment directly from the bank, they receive their prime de risque in cash from the health zone office. This creates more opportunities for diversion of payments thus altering the amount eventually received by the health worker.

In some cases, the prime de risque was lower than the salary while in other cases it was higher than the salary. However, this is not altogether surprising as according to the official pay-scale or "barème" (see annexe 1), the prime de risque is higher than the salary for doctors, surgeons and dentists, but it is lower than the salary for other health workers. Most workers received some sort of income from user fees. Usually, once some of the monthly revenue from user fees has been allocated towards paying for the running costs of the facility, a decision is made by the head of facility locally on the "prime locale" to be apportioned to each worker. In most cases, a small portion of the user fee revenue is also returned to the health zone office. The absolute amount received by each worker is expected to be variable as it is linked to the total number of patients seen by the facility each month.

It would also be expected that the money received by workers from per diems is highly variable as it is linked to programmatic activities undertaken which are often sporadic and without a regular schedule, e.g. workshops or vaccination campaigns. The amounts received per month are also likely to be small because activities linked to per diems are unlikely to occur every month but rather a few times per year. The results here indicate that those in more high profile jobs, e.g. doctors, were more likely to receive per diems. This concurs with evidence from some recent interviews with health workers who felt that more senior staff took advantage of such opportunities rather than allowing more junior staff to participate.[v]

In terms of performance payments or partner payments, the varying results can be explained by the differential presence of donor and non-governmental organisation programmes in provinces. For instance, in Maniema, the ASSP programme had been phasing out performance payments paid in a previous DFID programme. Many workers would still have been receiving these while the study was conducted. The PARSS World Bank programme employs performance-based financing; in South Equateur due to logistic issues, only PARSS-supported health zones were sampled explaining the high proportion of these payments being reported for this province. In conflict-affected South

[v] Recent qualitative research as yet unpublished as part of an ASSP operational research study on health worker motivation

Kivu, the presence of numerous non-governmental organisations and humanitarian actors may also explain the high number of payments from partners. In some cases, partner payments did not appear to differ greatly in terms of amounts earned compared with salaries and prime de risques. Nonetheless, doctors in Katanga and nurses in Kasai Occidental could earn more from partner payments than either a salary or prime de risque, and therefore these payments have the potential to distort worker incentives.
The recent dictatorship of Mobutu joked about Article 15, a supposed article of the constitution urging state employees who were rarely paid to "help themselves" ("débrouillez-vous") in order to survive.[28] From the results, it would appear that this has been taken seriously by most workers; as many do not receive any form of payment from the state, a large proportion of workers conduct private practice, supplement their income through non-clinical activities and even receive informal payments from patients.

Doctors tended to receive the highest amounts of informal payments. This could be due to that fact that doctors will have more interactions with patients compared to laboratory workers or pharmacy workers for example, and so increasing opportunities to extort money from patients. In addition, their status is usually the most senior in the facility, thus allowing them to demand more from patients compared to other cadres. It is possible that patients willingly pay more than the user fees owed as a way of thanking workers for treatment but given 60% of the population live on less than $1.25 per day,[29] this seems unlikely as most patients would struggle to pay the user fees alone.

Across all provinces, private practice did not seem to be that common. This may have been a function of sampling as private clinics are more common in urban areas compared to rural areas, and the majority of the samples for both studies were facilities in rural areas. However, there is no legal impediment to public sector health workers working in private facilities as well. The separate DFID report which conducted some qualitative work around remuneration gives some reflections as to the reasons why private work may not be commonly practiced.

Many workers in all provinces admitted to gaining supplemental income from non-clinical activities. The majority derived this income from agriculture, livestock/hunting. This could be because most workers interviewed lived in rural areas where this is the most accessible supplemental activity. There was no obvious pattern between the cadres and practice of supplemental activity; practice may vary according to the local opportunities available to do so. Also, doctors who practiced supplemental activity seemed to make the most money from this compared to all other cadres. This was perhaps because they generally earned more than other cadres for clinical work and so they could afford to invest more capital into other activities to make them more lucrative.

In terms of overall income, the DFID study found that all cadres with the exception of doctors, made the most of their revenue from supplemental non-clinical activities. On the other hand, the World Bank study suggested that user fees made up most of total income for these cadres. Half of the areas sampled by the DFID study were in the location of the ASSP programme which has a policy to heavily subsidise user fees and so this may account for the difference observed.

Differences between the studies

Given that the results presented here have been derived from two different studies, it is important to acknowledge that differences in the sampling and methods of each study may explain some of the variation observed. The World Bank included a higher proportion of CSR facilities, which tend to have more staff than CS facilities as they provide a slightly broader range of services. The DFID study also included a higher proportion of facilities in rural areas; according to the national standards or "normes", CS or CSR in rural areas require less staff compared to urban areas.

Another difference between the studies related to inquiry around sensitive sources of income such as informal payments or "cadeaux". In the DFID study, respondents were asked to report the amount received and were reassured that their response would be confidential and not linked to them in the final report. On the other hand, the World Bank employed a technique called "unfolding brackets" in order to mitigate non-response to this question. This technique may have succeeded in yielding higher response rates for these items, thus limiting the possibility to compare results between the two studies. Also the two studies have different ways to ask amounts received from informal sources, each way yielding potential and different biases. Direct questioning used by DFID could lead to underestimation of these amounts, due to socio-desirability bias. On the other hand, semi-structured amount prompts used in unfolding brackets may be subject to 'anchoring effects', which could bias individual estimates, even if the effect on the aggregate estimates of amounts is not clear.[30]

Limitations

Differences in the studies aside, there are also limitations applicable to both studies. Firstly, both studies recruited workers present on the day of the survey. It is possible that the sources and amounts of revenue of workers who are likely to be present in facilities differs from that of workers who are less frequently working in facilities. However, the extent of this selection bias could not be measured in either study. Both studies also sampled a high number of nurses but far smaller numbers of other cadres, and so the results for these other cadres will be less generalizable. In particular, the results for cadres other than nurses in the DFID study are less reliable given the much smaller sample size. However, this is an interesting finding in itself, as it indicates that certain provinces may lack a diversity of personnel and may even be understaffed. However, it is important to note that both studies only interviewed personnel present on the day of the survey and did not attempt to describe the total number of personnel in facilities, so it is difficult to truly know whether facilities were understaffed.

Secondly, both studies were susceptible to the phenomenon of recall bias, a systematic error caused by differences in the accuracy or completeness of answers recalled by participants regarding events in their past. Ideally, responses would have been checked against a register on revenues if possible, however, robust formal documentation of this does not currently exist in CS or CSR. Thirdly, neither study could accurately define whether workers were receiving what they were supposed to receive according to the Ministry of Health pay-scale. This is because the pay-scale only stipulates administrative position as opposed to the qualification of the worker; neither study requested information on the worker's administrative position.

Many of the workers in the study did not fit easily into one of our pre-defined categories and so were included in the group "other". This is likely to be a heterogeneous group of individuals and it is difficult to know whether these workers were official personnel or not. It is also possible there was an element of misclassification bias in either or both studies, with workers misreporting their job titles. However, workers were also asked about qualifications in order to verify job status and the workers in this category were not formally qualified; this alone is an interesting finding and may highlight the need for more qualified personnel in these facilities.

Finally, given the different methods employed by both studies (in terms of sampling, questioning etc.) it was not possible to conduct a combined extensive analysis of the data. However, it is hoped that this descriptive report will give stakeholders an overview of the variation of health worker remuneration in primary care facilities over a large number of provinces. For more extensive analyses, please refer to the separate DFID and World Bank reports on health worker remuneration.

Strengths

A key strength of this analysis is that it has generated a wealth of information on health worker revenues from eight out of the eleven provinces in the DRC. This has only been possible through the co-operation of researchers from the two studies and is an excellent example of partnership working and co-ordination between different agencies. The other benefits of this collaboration have been the sharing of lessons learned, particularly around methodological approaches and logistics of data collection. The studies have also sought to build local capacity within the Kinshasa School of Public Health, which has been the institution responsible for data collection in both studies.

Another strength is that the information collected by both studies is reasonably comparable. Both studies gathered data from facilities of the same profile, and respondents were selected in a similar way. It was also fortunate that the World Bank study could incorporate similar variables to the DFID study thereby enhancing comparability. In addition, both studies sampled facilities at random thereby resulting in a non-biased sample of health workers in each province.

Finally, both studies were implemented in 2014 and so it is unlikely that not much change would have occurred in health worker revenues over the course of one year.

Conclusion

In conclusion, these are the first studies in several years to quantify the average levels and the extent of the variation in health worker revenues in the DRC. It can be seen from the results that there is an urgent need to review the current policies around the payment of salaries and primes de risque. This study provides strong evidence for this, particularly for the remuneration of nurses who make up the majority of the primary health care workforce. In addition, payments from partners are sometimes larger than government payments. Co-ordination between all partners involved in paying health workers is therefore necessary to avoid distorting health worker incentives. It is also apparent that informal payments continue to occur in facilities; such payments pose barriers to

accessing healthcare given the poverty of the population. The inadequacy of revenue gained by health workers in state facilities is also diverting many workers into activities outside of the health profession, which could impact negatively on their commitment to clinical responsibilities. Providing adequate financial incentives would remove pressures to tend to supplemental income-generating activities.

Annexe 1

Barème actuel des agents et fonctionnaires de l'état du ministère de la santé publique

N°	*GRADES*		*ADMINISTRATIFS*		*PROSANTE*		*MEDECINS*		*CHIRURS, PHICIENS ET L2*	
	FP	***SANTE***	***SALAIRE***	***PRIME***	***SALAIRE***	***PRIME***	***SALAIRE***	***PRIME***	***SALAIRE***	***PRIME***
1	SG	EN CHEF 5 EN CHEF 4	**98.879**	—	**105.147**	**203.000**	**105.147**	**919.949**	**105.147**	—
2	DG	EN CHEF 3 EN CHEF 2	**97.459**	**120.500**	**102.155** **101.187**	**180.000** **170.000**	**102.155** **101.187**	**827.854**	**102.155** **101.187**	**572.949**
3	DIRECTEUR	EN CHEF 1 EN CHEF	**96.923**	**120.500**	**100.160** **99.162**	**152.200** **140.500**	**100.160** **99.162**	**723.359**	**100.160** **99.162**	**515.654**
4	CD	INSPECTEUR	**94.430**	**98.100**	**95.177**	**123.300**	**95.177**	**631.054**	**95.177**	**458.360**
5	CB	CHEF CLIN CHEF SCE	**92.403**	**83.000**	**93.177** **91.182**	**111.400** **93.500**	**93.177** **91.182**	**561.569**	**93.177** **91.182**	**401.064** **330.200**
6	ATB1	DH2	**88.564**	**61.000**	**90.187**	**81.200**	**90.187**	**504.470**	**90.187**	**347.750**
7	ATB2	DH1	**86.956**	**47.000**	**89.187**	**58.000**	—	—	**89.187**	**286.474**
8	AGB1	DHA	**85.692**	**32.500**	**87.591**	**52.127**	—	—	—	—
9	AGB2	HOSP1	**84.894**	**26.500**	**86.195**	**38.204**	—	—	—	—
10	AA1	HOSP2	**84.256**	**21.200**	**85.197**	**27.402**	—	—	—	—
11	AA2		**72.000**	**19.700**	—	—	—	—	—	—

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