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Policy options for improving the performance of community health workers (CHWs) in maternal and child health in Brazil: analysis of barriers and facilitators to CHW national program and evaluation of a community-based trial in Recife

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Abstract

Background and objectives. A growing amount of studies and international agencies' policy documents, while acknowledging the potential of Community Health Worker (CHW) programs in improving reproductive maternal newborn and child health (RMNCH) outcomes, solicit more in-depth investigations on the implementation process of such programs. Moving from the international debate on the role of CHWs, the current emphasis on quality improvement in RMNCH and on system thinking applied to health systems, the research is aimed at developing analytical and policy tools to improve the performance of CHWs in Brazil, a country whose CHW program is considered among the most valuable models globally.

Methods. The research was conceived as a three-step process. The first step, through a systematic review of qualitative studies conducted in Brazil on CHWs and building on concepts driven from the international literature, develops a logic model to describe factors influencing CHWs' performance and their underlying mechanisms. The second step, moving from a qualitative insight into the factors influencing the outcome of an intervention trial aimed at supporting CHWs in conducting home visits to pregnant women and mothers, is aimed at further validating the model and providing further information on barriers and facilitators to CHWs' performance. The third step uses the logic model to identify and systematize policy options, contextualized to the Brazilian system, to improve the performance of CHWs across all their attributions and tasks as well as in a specific area such as RMNCH.

Results. The systematic review, supporting the findings of international literature, showed that, although the main factors influencing CHWs' performance reside in the formal health system components and in the sub-system elements of the CHW program, the community system represents a further important source of complex interactions that impact on CHWs' performance. The logic model developed on this basis facilitates the identification, analysis and visualization of these factors and their dynamics. The case study confirmed the validity of the model for analyzing and interpreting the results of the intervention trial and identifying gaps in its design and implementation and provided hints about how interventions and policies aimed at improving CHWs' performances should be conceived to improve their effectiveness. Using the model as the reference framework, policy options were systematized and proposed as: a) a comprehensive compendium of actions to improve CHWs' performance; b) policy

packages corresponding to the levels of responsibility (Federal, State and Municipal) regarding CHW program in the Brazilian health system; and c) combinations of interventions of increasing complexity aimed at improving CHW performance related to RMNCH .

Conclusions. The review of qualitative studies and the analysis of implementation factors influencing the results of an intervention targeting CHWs generated useful insights to better understand the complex dynamics affecting CHWs' performance. The analytical and policy tools that were developed may be useful for a more systematic and evidence-based approach to improving the performance of CHWs in Brazil and to stimulate and facilitate a policy dialogue among all stakeholders including health professional and the communities they serve. The logic model, populated with institutional and behavioral facilitators and barriers, can help to identify areas that require action for program strengthening. The policy systematization can guide, at various levels of the system, the development of policy packages aimed at improving RMNCH-related tasks of CHWs in a broader systemic perspective.

Key words: community health workers, maternal and child health, health professional performance, qualitative review, system thinking

TABLES

FIGURES

BOXES

Acknowledgements

List of acronyms

CHW = Community Health Worker (In Portuguese: ACS, Agente comunitario de saude)

CPD = Continuous Professional Development

e-SUS = Sistema Electronico Unico de Saúde

ECD = Early Child Development

FHS = Family Health Strategy (In Portugues: PSF, Programa de Saude da Familia)

FHT = Family health Team

FHU = Family Health Unit

HIC = High income country

HV = Home Visit

IS = Information System

LMIC = Low Middle income country

MCH = Maternal Newborn and Child Health

MDGs = Millennium Development Goals

MoH = Ministry of Health

NASF = Nucleo de Apoio as equipes de Saúde da Famila

NGO = Non Governmental Organization

NPHCP = National Primary Health Care policy (in Portugues: PNAB, Política Nacional de Atenção Básica)

PACS = Programa de Agente Comunitario de Saude (CHW program)

PHC = Primary health care

PHCIS = Primary health care information system (in Portuguese: SIAB: Sistema de Informaçao de Atençao Basica)

QI = Quality Improvement

QoC = Quality of Care

RMCH = Reproductive Maternal Newborn and Child Health

SDGs = Sustainable Development Goals

TB = Tubercolosis

UHS = Unified Health System (in Portuguese: SUS, Sistema Unico de Saude)

UN = United Nations

WHO = World Health Organization

Introduction

This work lies at the intersection between the current debate on CHWs, the emphasis on quality improvement in reproductive, maternal neonatal and child health (RMNCH) and the relevance of system thinking applied to health systems. Its ultimate aim is to develop analytical and policy tools that may be used to improve the performance of CHWs in Brazil, a country whose CHW program is unanimously considered among the most valuable models globally.

To pursue this aim, the research has comprised three steps, each of them representing an independent piece of research, and yet part of a consequential process, which is reflected in the structure of the dissertation.

The first step, through a systematic review of qualitative studies conducted in Brazil on CHWs and building on concepts taken from the international literature, develops a logic model to describe factors influencing CHWs' performance in Brazil and their underlying mechanisms (Chapter I).

The second step, moving from a case study built around a qualitative insight into the factors influencing the outcome of an intervention trial aimed at supporting CHWs in conducting home visits to pregnant women and mothers, is aimed at further validating the model and providing further information on barriers and facilitators to CHWs' performance (Chapter II).

The third step uses the logic model to identify and systematize policy options, contextualized to the Brazilian system, to improve the performance of CHWs across all their attributions and tasks as well as in a specific area such as RMNCH (Chapter III).

The work is directed to different types of stakeholders: health authorities, policy makers and analysts at Federal, State and Municipal level, program evaluators, researchers and health professionals, including CHWs and their representatives.

The very recent approval by Brazil's federal authorities of a new version of the National Primary Health Care Policy (NPHCP - Política Nacional de Atenção Básica, PNAB), which introduced a series of relevant measures for the role of CHWs, makes the need of a policy dialogue around this component of Brazil's PHC system even more compelling.

Background

1. Potential and effectiveness of CHW programs

1.1 Increasing international interest for CHW programmes

Community health workers (CHWs) are a special type of health professionals, whose recognition and diffusion have been gradually growing worldwide. Their use in health programmes dates back to the 70's, with the adoption in Alma Ata of the primary health care (PHC) principles by the World Health Organisation (WHO) (WHO, 1978) and since then accepted by a growing number of Member States. Although the attempts to scale up CHWs' programmes faced several implementation challenges and a decline in investments during the 80's and 90's, nowadays CHWs are considered strategic resources for the health system and its strengthening at community level (WHO, 2012; Perry, Zulliger & Rogers 2014; Walt, 1990). Their role is particularly important to improve the access to essential health interventions for disadvantaged and hard to reach population groups (Barros et al., 2012).

Although CHWs share some common characteristics across all types of health systems and economies, it is hard to stick to a strict and univocal definition of their role. Comparative reviews of evidence on CHWs identified a variety of typologies of CHWs and CHW programs (Liu, Sullivan, Khan, Sachs & Singh, 2011; Perry, Zulliger & Rogers, 2014; Zulu, Krinsman, Michelo & Hurtig, 2014). Definitions and names include 'lay health workers', 'village health workers', 'community health promoters', 'community health agents', amongst others (Bhutta, Lassi, Pariyo, & Huicho, 2010; Perry et al. 2014; Zulu et al., 2014; Liu et al., 2014). Their profile and scope are highly contextual, their tasks and professional status vary greatly from one country to another and sometimes even within countries. CHWs can perform diverse functions connected to health care: they can be employed in vertical programmes or with a broader horizontal scope addressing multiple areas of health. Their activities can include health promotion, prevention and education, delivery of basic health services, facilitation of access to health facilities (Bhutta et al., 2010; Liu et al., 2011; Perry et al. 2014; Zulu et al., 2014). Selection criteria and working conditions also differ across programmes and health systems. CHWs can receive a salary, or work as volunteers without any formal remuneration, or receive

other types of benefits and incentives. CHWs could be publicly employed within the formal health system, or hired by NGOs within specific projects. Generally, CHWs are not required to hold any formal professional or paraprofessional certificate but a primary or secondary education degree and are employed after a training related to their area of intervention (Lewin et al., 2005; Bhutta et al., 2010; Liu et al., 2011; Glenton et al., 2013; Perry et al. 2014; Zulu et al., 2014).

The wide range of typologies of CHWs is mainly dependent on the extent CHWs programs are integrated in health system and on the scale of these programs (Liu et al., 2011; Zulu et al., 2014). CHWS may be involved in programs developed at national and large-scale level, or in small-scale, sometimes short- term projects linked to specific funding. As a result, implementation strategies may also include a variety of approaches regarding selection criteria, training, incentives, career opportunities, supervision, link with the community, work environment and organization, coordination and management (Zulu et al., 2014).

Recently, attention for CHWs has again reached momentum, and the global health community is increasingly committing resources to improve the quality and effectiveness of CHWs programs and to develop and test new approaches to face the multiple challenges linked to their implementation (USAID, 2012). This renewed interest responds to the acknowledgement that CHWs are a strategic workforce for the delivery of health care at community level particularly in health systems with very limited resources and vulnerable populations. In these contexts, the shortage of health workforce is undermining the ability to promote healthy behaviours and avert preventable morbidity and mortality, and ensure equitable access to essential health care (Barros et al., 2012; Gilmore & McAuliffe, 2013; WHO, 2012). CHWs programs can contribute to decentralize health care provision, enable 'lay' members of the community to build bridges between people and health care services, introduce health prevention and promotion, and facilitate access to health interventions otherwise hardly accessible for a variety of economic logistical and cultural barriers (WHO, 2006a; WHO, 2007a; Bhutta et al., 2010; USAID, 2012).

1.2 The role of CHW programs in RMNCH

The slow pace of progress towards the achievement of Millennium Development Goals (MDGs) 4 and 5 and particularly of maternal mortality ratio and neonatal mortality, has

drawn attention to the need of strengthening efforts in health care provision particularly in low and middle-income countries (LMICs), where progresses on maternal, newborn and child health (MNCH) have been were either insufficient and/or unevenly distributed across population groups (Bornstein & Stotz, 2008; Countdown to 2015, 2015; Temmerman, Khosla, Bhutta, & Bustreo, 2015; Requejo & Bhutta, 2015).

Maternal and newborn deaths can be prevented through simple evidence-based actions, and efforts to ensure effective and universally accessible interventions is sought as a major goal for averting maternal and infant mortality and morbidity across the preventative, diagnostic and treatment dimensions of care at all level of the system (WHO, 2011a). This commitment is further reiterated in the even more ambitious Sustainable Development Goals (SDGs), that aim to reduce the maternal mortality ratio to less than 70 per 100,000 live births, end all preventable newborn deaths, and reduce neonatal mortality and still births to less than 12 per 1000 births by 2030 (WHO, 2015a). As experienced during the MDGs era, it is not possible to overcome these challenges and reach the expected targets within fragile and fragmented health systems (Travis et al., 2004).

Health system strengthening become a priority, and within it, the shortage of well-trained human resources is considered one of the most critical weakness that should be challenged to secure the potential and effectiveness of programs and interventions (Ensor & Cooper, 2004; Campbell & Graham, 2006; Black et al., 2010; Anand & Bärnighausen, 2004; Bhutta *et al.*, 2010; WHO, 2010; Fotso & Fogarty, 2015; Gupta et al., 2011; Countdown to 2015, 2015).

In reaction to this situation, global attention has been paid to strategies and policies that could improve the availability and quality of human resources, including for the delivery of essential RMNCH interventions at first and community level (Fotso, 2015; WHO, 2006a; WHO, 2007a). In 2012, for example, WHO released new recommendations for the optimization of the roles and responsibilities of health workers for RMNCH interventions through task shifting, namely by training and enabling 'mid-level' and 'lay' health workers to perform specific interventions otherwise provided only by cadres with longer or more specialized training (WHO, 2012). In line with these considerations, attention newly emerged for the revitalization of CHWs and the need to improve their effectiveness (Perry, 2014).

Experiences attributing to CHWs the delivery of community level RMNCH interventions have been increasingly reported with promising results. Benefits were found for immunisation uptake, exclusive breastfeeding, TB treatment completion, reduction of neonatal and child mortality attributable to pneumonia and malaria, adherence to HIV antiretroviral therapy and counselling, access to prenatal care (Lewin et al. 2010; Bhutta et al., 2010; Pallas et al., 2013, Gilmore et al., 2013). Emerging evidence has also been produced to support the expansion of CHWs roles in child survival and early child development (ECD) community based approaches (Haines, 2007; Hurley, 2016). It was the case, for example, of ECD interventions provided by female health workers that were found to be feasible and impact significantly on early cognitive, language, and motor development (Yousafzai et al., 2016).

Despite these major achievements, however, the uncertainty regarding CHWs' effectiveness still remains and requires further investigation in order to thrive and transform CHWs potential (Lewin et al., 2005; Lewin et al. 2010; Glenton et al., 2013; Lassi & Bhutta, 2015).

The identification of new roles and responsibilities that could be effectively delivered by CHWs do not grant, in isolation, a translation into sustainable and successful CHWs' programs, nor safeguard the attainment of pre-existing targets. Critical reflections on how to develop, improve or alter CHWs' programs should position CHWs and their tasks within the system in which they perform (Haines, 2007). To be effective, CHWs programs, their design and implementation mechanisms, should adopt strategies that foster health system strengthening in a dialogue with key stakeholders, including the community of users, and should consider their integration with a broader range of emerging public health issues, including the burden of infectious and chronic diseases, and the delivery of services via a continuum of care (Haines, 2007; Yousafzai, 2013; Smith, 2014; Dawson, 2014; Naimoli et al., 2014; Hurley, 2016; Perry, 2017). These considerations should be reflected into CHWs professional curriculum and in-service training, mechanisms of support and supervision, monitoring and evaluation schemes, career development plans, forms of financial and non financial incentives for CHW's motivation, participation and interactions with community members and health workers at all levels, adequate supplies and equipment (Haines, 2007; Dawson, 2013; Yousafzai, 2013; Hurley, 2016). CHWs should be positioned within an enabling environment, and coupled with supporting institutional and behavioural mechanisms that strengthen the

process implementation of their program and the individual CHWs' performance (Haines, 2007; Dawson, 2013; Yousafzai, 2013; Hurley, 2016).

1.3. Factors influencing CHWs' performance: a growing field of research

Universal, equitable and effective access to PHC interventions, including those delivered by CHWs and those specifically related to RMNCH, depend on a variety of factors and dynamics (Haines et al., 2007; Perry et al., 2017). Studies and reviews reporting on CHWs' effectiveness solicited more in-depth investigations on the mechanisms for their success and failure (Lewin et al., 2010; Giugliani et al., 2011; Lassi, et al., 2015). In line with these analyses, efforts to identify and evaluate implementing strategies, as well as barriers and facilitators, across different health systems have increased. There is consensus that the availability of CHWs programs, and of CHWs working for it, per se do not guarantee a positive impact on health outcomes, and that more attention should be paid to understand the underlying mechanisms that influence CHWs' performance (Haines, 2007; Perry et al., 2014; Kok et al., 2014; Kok et al., 2015).

The concept of CHWs' performance itself is hard to be bounded in a sentence. In a WHO report on the improvement of human resources for health, health professional performance is defined as "staff being available (retained and present), productive, responsive and competent" (WHO, 2006a). The same report found that elements influencing performance are multifaceted, related to different levels of the health system and closely interconnected. In line with this statement, but with a wider perspective, Kok *et al.* (2014, 2015) defined CHWs' performance as a complex and transactional social process between CHWs and their environment.

Attempts to understand and assess what shapes CHWs' performance were the focus of recent reviews, which showed that CHWs' work and activities are determined by highly interlinked mechanisms of interactions and by variable degrees of integration between elements of CHW programs with components of the formal health system and the community systems (Glenton 2013; Naimoli et al., 2014; Kok et al., 2014; Kok et al, 2015). The studies included in these reviews were generally undertaken through a qualitative approach, in the attempt to account for influencers of the accessibility, acceptability, quality and sustainability of health programs, and particularly for attitudes values and preferences of stakeholders, as well as cultural social economical and environmental circumstances (Glenton, 2013; Kok et.al, 2014; Kok et.al, 2015).

The first attempt to systematically review this type of evidence was made by Glenton *et al.* (2013), who conducted an analysis of qualitative studies about factors and mechanisms, that could determine the success or failure of different types of CHWs programmes for RMNCH. The review included 53 studies from all over the world and reported on barriers and facilitators of interventions from the perspective of CHWs, mothers, program managers and other health workers. Findings highlighted a core set of factors that were deemed as relevant for the success or failure or programs, including CHWs relationship with health professionals and community members, program design (including training, supervision, incentives, delivery modes, tasks) and the integration of CHWs in the formal health system. Glenton et al. (2013) added on these factors by disclosing the underlying mechanisms of influence, or mediating effects, that turn these factors into obstacles or facilitators for CHWs and their success. For example, a close relationship between CHWs and community members was found to have an effect on CHW programs. However, the direction of this effect varied across the experiences reported in different studies included in the review, and could be act as a facilitator, when connections are grounded on trust, empathy and solidarity, but also as a barrier, when close ties with the community are perceived as a threat and /or a cause of lack of privacy (Glenton, 2013).

In the critical appraisal and final remarks of the review findings, together with the factors that should be considered desirable to secure for CHW programs, in order to facilitate their success, Glenton et al. (2013) also acknowledged that that the ultimate importance, direction and weight of each of these factors may be different across diverse CHW programs and deserve contextual explorations. In this review, heterogeneity of findings was only explored in relation to the study setting, here defined by the income level of the country. Although the pool of factors influencing CHW programs was quite uniform across high, low and middle income countries, regional variations were found for the direction and mechanism of effect of some of these factors. Potential explanations were found in the different perceptions, values and experiences of the informants in relation to the context (communitarian and institutional) where CHW program is set up, and their relationship with it (Glenton, 2013).

The studies of Kok *et al.* (2014, 2015) expanded the study of Glenton et al. (2013) by providing two systematic reviews of international peer-reviewed articles on CHW

programs in order to specifically assess the impact of their design characteristics and other contextual factors on CHWs' performance. The results clearly showed how CHW program design is a crucial modelling factor for CHWs' performance, and key characteristics that emerged as relevant included human resources management - from selection and remuneration to training and supervision -, quality assurance mechanisms, organization of service delivery, including the definition of CHWs' tasks, and interaction with community members and other health system components. These findings are in accordance with the work of Glenton et al. (2013), and provide an improved systematization. Other factors that were found to impact on CHWs' performance beyond programme design included the social context of communities such as educational level, values and norms, environmental and economic conditions, and broader health sector policies and functionality. Similarly to Glenton et al (2013), Kok (2014, 2015) accompanied the identification of modelling factors with more details on the type and direction of this influence. Additionally, in line with Glenton et al. (2013), the synthesis provided by Kok (2014, 2015) provided further evidence of the bidirectional nature of the impact that some factors may have on CHWs' performance. For example, community support was identified as both a barrier and a facilitator to CHWs' performance, through its effects on CHWs' motivation.

Kok's reviews (2014, 2015) greatly expanded the work of Glenton (2013) for the breath of variations reported on the influencing dynamics and mechanisms connected with each design and contextual factor of CHW programs, and therefore facilitate a more critical and informed understanding of their possible impact. However, the more detailed are the mechanisms derived from selected factors, the less they get supported by a sufficient number of references, such as in the case of financial incentives. Financial incentives seem to increase CHWs' motivation across studies; however, a further definition of types and aim of incentives, such as in-kind versus financial, or performance-based, not only have different effects on CHWs' performance, but they are also supported by little evidence.

These considerations add to what previously argued for the work of Glenton (2013). Both authors, indeed, collected evidence from all types of CHW programs. Although Glenton (2013) restricted her researches on RMNCH health programs, while Kok (2014, 2015) on evidence from LMICs, the sample of CHW programs analyzed in their work is not homogeneous, and guidance on how to interpret their findings across different

types of CHW programs is missing. In line with the findings of Glenton (2013) and Kok (2014, 2015), but with a stronger level of theorization, abstraction and completeness, the work of Naimoli *et al.* (2014) provides a wide and detailed overview of all the factors that can impact on CHWs' performance and their possible connections with CHWs' performance. The work presented by Naimoli (2014) involved a numerous group of researchers for two years, to explore all peer-reviewed articles and grey literature on the theme. An important investment reflects in the breath of their work, which can be considered as one of the most comprehensive piece of research on factors that shape CHWs' performance.

Naimoli (2014) describes CHWs' performance as a function of multiple elements related to both the formal health system and the community system. Within these spheres, Naimoli (2014) reported that CHWs' performance is influenced by technical features and structural components, but also by behavioural attitudes and relationships among the actors involved. Structural elements comprise features of the CHWs program (i.e.: design, implementation, monitoring and evaluation system, etc…), the overall health system in which the programme is inserted (i.e.: leadership and governance, financing, human resources, service delivery, etc.) and the profile of communities where CHWs perform (i.e.: media, NGOs, community leaders, etc.) Behavioural dynamics included aspects of CHWs' attitudes (i.e.: motivation, stress, morale, satisfaction), as well as their relationships with individual patients and their communities (i.e.: social recognition, trust, acceptance), and with other health professionals (i.e.: credibility, prestige, recognition).

In the attempt to reach a higher degree of abstraction and generalization, differently from what provided in their reviews by Glenton (2013) and Kok (2014, 2015), the work of Naimoli (2014) is limited to a comprehensive list of factors and potential connections between structural and behavioural elements that interact and impact on CHWs' performance, with no evidence on individual field experiences (which were rather used as background material for this work). While the work of Naimoli (2014) should be considered as a leading work for the identification of factors which should be considered when analyzing, or attempting to improve CHWs' performance, Glenton (2013) and Kok (2014, 2015) provide guidance on hypothetical mechanisms of influence between these elements, and therefore on how to conduct contextual analysis of CHWs' performance.

This body of literature represents an extremely important and valuable source of knowledge and theorisation on barriers and facilitators of CHW programmes, as well as a starting point for more in-depth investigations on CHWs' performance. Due to their wide range of typologies and the highly contextual-dependent and heterogeneous nature of CHW programs, CHWs' performance is likely to encounter different barriers and facilitators depending on the implementation contexts and the combined effects of interactions across a diverse range of program set ups. For all these reasons, there is a need to apply the results of global thinking on CHWs' performance to local CHWs programs and realities, to explore the characteristics which lead CHWs to perform better in a specific context and within a specific CHW program, and to understand how each factor interplays with other contextual elements to increase or decrease the motivation of these workers.

2. Improving quality of care in RMNCH

2.1 Quality as key to RMNCH outcomes: the role of competent and motivated human resources

The WHO Vision for quality of care for mothers and newborns defines quality of care (QoC) as *"the extent to which health care services provided to individuals and patient populations improve desired health outcomes. In order to achieve this, health care needs to be safe, effective, timely, efficient, equitable, and people-centered"* (IOM, 2001; WHO, 2006b).

The international community started to pay attention to the issue of to QoC in RMNCH when it became increasingly clear that, while access to and use of services, particularly for childbirth care, were rapidly increasing in most countries, particularly in LIMCs, maternal and newborn outcomes were not improving at the same pace (UN, 2014). Serious gaps in QoC along the whole continuum from reproductive health to prenatal, perinatal, postnatal and newborn child and adolescent care emerged as a major impediment to desired outcomes in many settings (Graham & Varghese, 2012; Raven, Tolhurst, Tang & van den Broek, 2012; Wilunda et al. 2015).

A number of studies contributed to develop and test quality improvement (QI) strategies. Many of these focus on working to overcome barriers to adaptation and implementation, to be analyzed through a variety of methods (Campbell et al., 2006; Raven et al., 2011; Bhutta et al., 2014). Prompted by this evidence, a growing political commitment developed. The Every Newborn Action Plan and the Strategy for Ending Preventable Maternal Mortality recognize that investments in QoC are necessary in order to translate access into effective coverage of essential interventions (WHO, 2014; WHO, 2015a) and to meet the targets set by the Global Strategy for Women's, Children's and Adolescents' Health (UN, 2010).

Early in 2016, a global initiative to address high rates of maternal and newborn deaths and stillbirths, particularly in countries where access to institutional deliveries is satisfactory, was launched by WHO together with other UN Agencies, national aid agencies, international NGOs, professional organization and research centers. The initiative was grounded in a broad vision and framework of quality of maternal and newborn care (Figure 1) (Tuncalp et al., 2015).

Figure 1 WHO QoC framework for maternal and newborn health: the vision
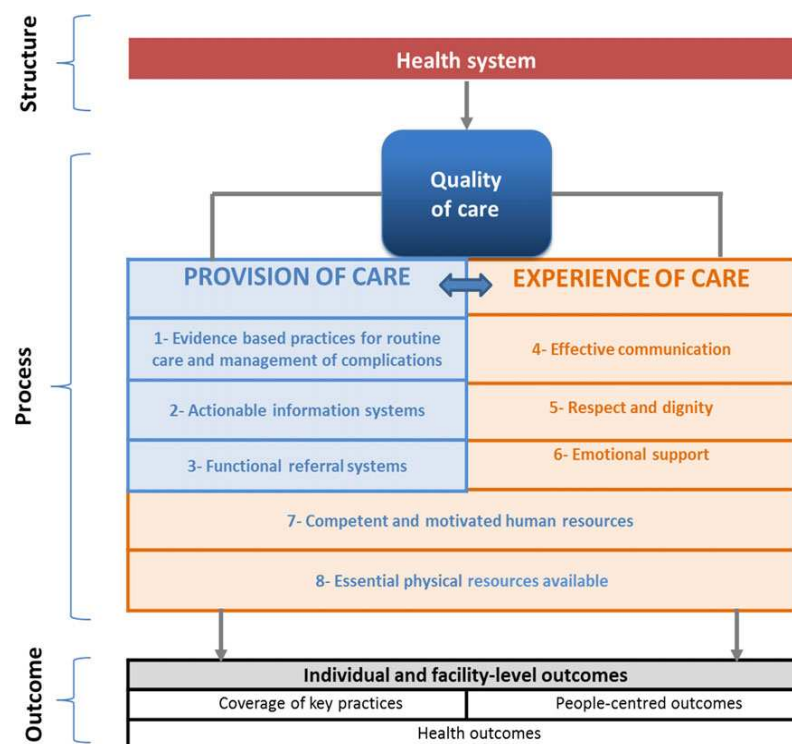
The vision recognizes that quality of care includes two sets of process components: on one side the provision of care (evidence-based practices, actionable health systems and functional referral systems) and on the other the experience of care (effective communication, respect and dignity and emotional support). Besides the essential health infrastructure and commodities, quantitatively adequate, competent and motivated human resources are crucial in ensuring quality in both provision of care and experience of care ultimately impacting the reproductive, maternal newborn and child outcomes (WHO, 2008a, WHO 2012).

Within the human resource theme, the use of CHWs in a variety of roles is debated according to two quite different perspectives: on one side as a way to compensate, through task shifting, to the scarcity of health professionals. and particularly of nursing staff; on the other as a way to reach out for communities otherwise left with little or no access, logistical financial and cultural, to health services (WHO, 2007a; WHO, 2012; WHO 2014b).

2.2 The need for systemic and contextualized approaches to address the complexity of factors influencing CHWs' performance

Within this vision of quality improvement, enhancing the performance of health workers, including CHWs, is a key objective of all QI efforts. Competence and motivation, however, are the essential but not the sole components of professional performance, which is defined as "a function of employee ability, motivation *and* opportunity to participate or contribute" to the work (Boxall, 2003). To ensure a good performance, CHWs need to be competent, i.e well qualified for the tasks they are supposed to carry out, and to have an adequate working environment in terms of acceptable contractual conditions, workload, supplies and equipment, and support by the system. In its turn, motivations is the result of many of all these external factors interlinked with intrinsic motivation components such as social responsibility and self-efficacy (Ballard & Montgomery, 2017). Thus, improving quality of care implies putting emphasis on improving CHWs' competence, on working to improve intrinsic and external motivating factors, but also on recognizing that the ultimate professional performance depends from a series of systemic factors. A well qualified CHW worker may not be motivated to perform well for a variety of reasons, or may be motivated but

insufficiently qualified, or may be qualified and motivated but unable to perform due to a variety of factors, as it has been discussed previously for CHWs in section 1.3.

When considering performance improvement, as for many other improvement cycles, the situation analysis is the first, crucial step (Tuncalp et al., 2015). This analysis cannot be limited to identify gaps in specific performances, but must go more in depth in order to identify underlying causes and mechanisms. This analysis is crucial not only in that it may or may not identify the "causes of the causes" of gaps and inadequacies in the delivery of services, as typically done in the near-miss approach (WHO, 2011b) but because, if conducted with the active participation of health providers and users, represents a learning experience which helps building awareness about QoC issues and options for QI and frequently leads per se to some improvement by supporting both competence and motivation (Tamburlini, Yadgarova, Kamilov & Bacci, 2013). All too frequently, as it occurred to observe during a QoC/QI intervention in a low income country, QI is practiced as a vertical initiative where compliance with standards is the only dimension considered, and staff qualification and motivation, let alone their active participation, are not taken sufficiently into account (Vezzini & Tamburlini, 2016). It is important, to this respect, to emphasize that the development of "learning communities for improvement" has been included in the WHO framework among the 11 categories that have been identified as key components of country strategies for improving quality of care in maternal and newborn health (Tuncalp et al., 2015). The peculiar role of CHWs as bridges between the formal health system and the community makes the challenge of improving their performance even more complex than for other health professionals, as the variety of factors involved increases to include those depending by the community system (Glenton, 2013; Kok, 2014, 2015; Naimoli, 2014). The need for a system approach to improving their performance becomes even more compelling.

The solutions to poor performance are often highly context dependent, so they cannot be prescribed or applied without adaptation across the systems. Using the best available evidence for what interventions should be used to improve competence and motivation and the experience of using these approaches at scale is essential but still not enough. Approaches need to be applied flexibly, understanding that every country and health system is unique (Dieleman and Harnmeijer, 2014).

In conclusion, since programs involving CHWs are extremely variable across countries and sometimes even within countries, the analysis of factors that influence their performance and the identification of solutions to poor performance need to adopt approaches which are both systemic and highly contextualized.

3. A system approach to Health Systems

3.1 Analyzing health systems: the health system building blocks

Health systems have increasingly been considered as complex social systems governed by dynamic, non-linear, self-organizing and context-dependent interactions among its components (Gilson, 2012). Health systems comprise a wide range of actors and institutions that are influenced by available resources and technologies but also by values and power relationships (WHO, 2000; WHO, 2006a).

Accordingly to a definition provided by WHO in 2007, the health system consists of: 1. all the activities whose primary purpose is to promote, restore and/or maintain health; 2. the people, institutions and resources, arranged together in accordance with established policies, to improve the health of the population they serve, while responding to people's legitimate expectations and protecting them against the cost of ill-health through a variety of activities whose primary intent is to improve health (WHO, 2007b).

The health system boundaries, that is the outer limits within which the health system operates, including context, institutions, capacities, are fluid, since the delivery process of health care is highly interlinked with other sectors and systems that contribute to the same aim (WHO, 2007b).

A variety of approaches to categorize health system components and describe their relationships were developed in order to improve analysis and strengthening efforts. The "health system building blocks" (HSBB) is the most widely used health system analytical framework and identifies six core components: leadership and governance, service delivery, health workforce, health information system, infrastructure and equipment, and health system financing (WHO, 2007b). The definition of the requisites of each component for a functional health system is provided in Box 1.

Box 1 Definition of health system building blocks (WHO, 2007b)

- Service delivery: good health services are those which deliver effective, safe, quality personal and non-personal health interventions to those that need them, when and where needed, with minimum waste of resources;
- Health workforce: a well-performing health workforce is one that works in ways that are responsive, fair and efficient to achieve the best health outcomes possible, given available resources and circumstances (i.e. there are sufficient staff, fairly distributed; they are competent, responsive and productive);
- Health information system: a well-functioning health information system is one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status;
- Infrastructure and equipment: a well-functioning health system ensures equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness, and their scientifically sound and cost-effective use;
- Health financing: a good health financing system raises adequate funds for health, in ways that ensure people can use needed services, and are protected from financial catastrophe or impoverishment associated with having to pay for them. It provides incentives for providers and users to be efficient;
- Leadership and governance: leadership and governance involves ensuring strategic policy frameworks exist and are combined with effective oversight, coalition-building, regulation, attention to system-design and accountability.

3.2 System thinking applied to health systems

Despite some analytical obstacles, due to inevitable overlap between elements of each building block, the HSBB framework was further developed to represent its dynamicity within a "system thinking approach" (de Savigny & Adam, 2009). This new model place people in the centre of all building blocks in order to portray their participation within the system not only as passive recipients of a product, but as active contributors that influence and shape this product and the system itself through their behaviours, reactions and interactions (Figure 2).

Figure 2 Health system building blocks within a system thinking perspective (de Savigny, 2009

System thinking assumes that any system, such as the health system, is organized by different levels of complexity in individual components and sub-systems (in this case building blocks) that are organized in hierarchies, that are interacting with each other and, consequentially, influencing each others. Additionally, it assumes that all actors involved in each sub-systems component shape, and are shaped, by these dynamics. Interactions between and within components and actors are complex, highly interlinked, governed by feedback, contextual and non-linear (Gilson, 2012).

"*Understanding and working with complexity requires a paradigm shift from linear, reductionist approaches to dynamic and holistic approaches that appreciate the multifaceted and interconnected relationships among health system components, as well as the views, interests and power of its different actors and stakeholders*" (Adam & de Savigny, 2012).

For this reason, any attempt to design, evaluate and improve the overall system, or a part of it, in order to be comprehensive and adaptable to real life settings, should take into account the overall complexity and interdependency across actors and components, and privilege systemic thinking to a more static classic approach (Table 1).

Table 1 Skills of system thinking (Adam, 2012)

Classical approach	Systems thinking approach
Static thinking	**Dynamic thinking**
Focusing on particular events	Framing a problem in terms of a pattern of behaviour over time
Systems-as-effect thinking	**System-as-cause thinking**
Viewing behaviour generated by a system as driven by external forces	Placing responsibility for a behaviour on internal actors who manage the policies and 'plumbing' of the system
Tree-by-tree thinking	**Forest thinking**
Believing that really knowing something means focusing on the details	Believing that to know something requires understanding the context of relationships
Factors thinking	**Operational thinking**
Listing factors that influence or correlate with some result	Concentrating on causality and understanding how a behaviour is generated
Straight-line thinking	**Loop thinking**
Viewing causality as running in one direction, ignoring (either deliberately or not) the interdependence and interaction between and among the causes	Viewing causality as an on-going process, not a one-time event, with effect feeding back to influence the causes and the causes affecting each other

3.3 Health policy and system research

Health services, programs and interventions share with health system a similar nature, as they can be considered as sub-components of it (Gilson, 2012). For these reasons, all services, programmes and interventions delivered within a certain health system are composed, shaped and influenced by their formal and informal organizations and networks, by their structural, human and social factors, by their institutional, socio economic and cultural context, and lastly by the people who act and interact with and within it. (Bloom 2008).

This horizontal approach for the study of health services, policies and programs is promoted within the emerging field of health policy and systems research (HPSR). HPSR *"…seeks to understand and improve how societies organize themselves in achieving collective health goals, and how different actors interact in the policy and implementation processes to contribute to policy outcomes. By nature, it is inter-disciplinary, a blend of economics, sociology, anthropology, political science, public*

health and epidemiology that together draw a comprehensive picture of how health systems respond and adapt to health policies, and how health policies can shape − and be shaped by − health systems and the broader determinants of health" (Gilson, 2012).

There is an increasing interest in describing, analyzing and assessing operational aspects of health programs as health sub-systems. By improving the understanding of how health programs are developed and implemented, HPSR can contribute to identify and describe what inputs, factors and behaviours influence a specific program and its outcomes, identify and describe what causal pathways, or processes and connections, exist between health program components, actors and program outcomes, and lastly identify, describe and assess how inputs and causal pathways impact on programme outcomes, whether beneficial or not for their overall performance (Gilson, 2012; Roberts, 2008).

HPSR could contribute to reach a comprehensive and realistic picture of program functioning, implementation and performance on the field that could be used for formulating new programs, strengthening the design and implementation of existing ones, as well as developing adapted monitoring and evaluation systems, that are essential learning methods and information systems that could be used inform local, national and international to synergize their efforts for improvement (Gilson, 2012).

4. The CHW program in Brazil

4.1 Development and policy framework of CHW program in Brazil

Brazil established a national CHW program in the late 80's, as part of the effort to achieve universal coverage of PHC services within the Brazilian *Sistema Unico de Saúde* (Unified Health System, UHS) (MdS, 2001).

First developed as a voluntary work force, the experience of CHWs started in the State of Ceará, in the Northeast Region of Brazil, during the '70s, with the purpose of reducing high rates of infant and maternal mortality. Women were rewarded with a little incentive (comparable to the minimum wage of that time) and learnt from doctors and nurses the basic health concepts, regarding mainly the health of mothers and children, who were visited at home to assess their health status and to promote their access to prenatal and child care services. Success was mainly observed in children, whose

prompt access to paediatric care, with consequent reduction of infant and child mortality (MdS, 2001).

Brazilian CHW program has then gained attention and ultimately became a cornerstone of the national PHC system. In 1991, the CHW program was formally regulated by the *Programa de Agente Comunitario de Saude* (PACS) and in 2002, CHWs became an official professional cadre in the Brazilian health sector (Lei Federal nº. 10.507; MdS, 2001; MdS, 2009). Since 1994, CHWs activities were incorporated into the *Programa de Saude da Familia* (PSF), further developed in 2006 in the *Estrategia de Saude da Familia* (Family health strategy, FHS) (MdS, 2009; MdS, 2012). The FHS envisages that CHWs work in multi-professional teams (Family Health Teams, FHTs) composed by at least one doctor, one nurse, one nurse assistant, one dentist and several CHWs, usually 4 to 6. Nowadays, around 265.000 CHWs are working in approximately 40.000 health teams all around Brazil.

The *Política Nacional de Atenção Básica* (National primary healh care policy , NPHCP) is the official document that outlines principles and objectives of the national PHC system and defines its sub-system components, as well as all principles and policies for its implementation (MdS, 2012). This document is crucial for the understanding of the role of CHWs within the Brazilian context, since it sets values, formats, rules and activities and its connections with the health system network.

The Brazilian PHC is structured so to ensure the highest degree of decentralization in order to be close to people and act as the main gateway to the overall health care network. The principles behind the NPHC are:

- universality, to guarantee health care for all;

- equity, to ensure social justice across all citizens in their access to health services;

- comprehensiveness, to ensure continuity of care within the system and considers the person as a whole;

- decentralization, to allow the appropriate distribution of responsibilities across the network according to the complexity of interventions;

- responsiveness, to ensure the capacity of health system to promptly address health problems;

- community participation, to enforce the constitutional right of the population to participate in the decision making processes related to health policies.

PHC is characterized by a set of health actions targeting individuals and communities, which include health promotion and protection, disease prevention, diagnosis, treatment and rehabilitation according to the social and epidemiological profile of the population.

The FHS was first introduced in the '90s, with the objective to incorporate, expand and support the PACS and the activities of CHWs. FHS is aimed to promoting, protecting and caring for the health of all individuals within the communities.

The FHS is implemented mainly through multi-professional teams, belonging to family health units (FHUs) which are responsible for an area including from 3 up to 4.5 thousand patients. FHTs use complex, low-intensity care based on simple technologies.

Other people may be part of this team, such auxiliary or technical nurses; oral health professionals, including surgeon generalist dentist or family health specialist, as well as an oral health assistant and /or technician. Additionally, FHTs may rely on additional human resources and external groups of specialist, for example, the *Nucleo de Apoio as equipes de Saúde da Família* (NASF – support unit to family health teams). The NASF could include social workers, pharmacists, physiotherapists, nutritionists, occupational therapists, amongst others.

4.2. CHWs' tasks and roles within the FHTs

As previously explained, CHWs are formally embedded within the UHS, within the FHS.

CHWs are selected through a public recruitment process hold by the municipality, or the state, and ruled by law since 2006 (Lei Federal nº 11.350/2006). CHWs candidates must have completed elementary school at the time of the selection process (with the exception of those who have already served as CHWs before October 2006) and prove to reside where they will work.

The employment conditions are defined by a national legal framework and since they are part of the public administration, they are engaged through a direct public employment contract (Lei Federal nº 11.350/2006). Salary is set for the whole country. The main source of financing for the CHW program comes from the federal government,

although salaries are delivered through state and municipal mechanisms, and could be increased if funds are available (together with the number of CHWs). Working hours are also ruled by law and are set to 40 hours per week, while career plans must follow national guidelines.

CHWs should work within a FHT, generally under the coordination of the nurse. Each CHW is responsible for care of a micro-area of the community where the FHU is based, up to a maximum of 750 patients each. General tasks CHWs under the responsibility of CHWs are defined by law (Lei Federal nº 11.350/2006) and better detailed in the NPHCP.

By law, CHWs tasks include:

I - the use of instruments for the demographic and socio-cultural diagnosis of the community;

II - the promotion of educational actions for individual and collective health;

III - the registration, for exclusive purposes of control and planning of health actions, of births, deaths, diseases and other health problems;

IV - the encouragement of community participation in public policies focused on health;

V - the realization of periodic home visits;

VI - the participation in actions that strengthen the links between the health sector and other policies that promote health.

The NPHCP further details CHW program, its principles and implementing rules and provide a description of functions and responsibilities collectively shared by all health professionals working within the FHTs, including CHWs (Table 2).

Table 2 List of tasks as detailed in the NPHCP for CHWs [CHWs], nurses [N], doctors [D], and commonly shared across all team members [T]

CHWs - team members	CHWs (and team) - community
• *training and supervision*: - [N] Supervise, manage and evaluate CHWs activities; - [N, D] Organize continuous education activities for team members, including	• *service delivery*: Target and spaces -[T] Provide health care services within the health units, at home and in community spaces (schools, churches, organizations);

CHWs;
- [T] Attend continuous education events;
- [T] Organize team meetings for discussions and support.

•*organization of work and internal M&E*
- [T] Organize team meetings to develop and share actions, plan team activities, coordinate individual actions (such as home visits, reception, health promotion and education activities), evaluate team and health professional performances and program implementation and discuss quality improvements;
- [CHWs]Register all families under their responsibility and keep the register updated;
- [T] Map families under team responsibility to identify vulnerabilities and "at risk" groups;
- [T] Use systematically the information system and its data for planning local activities of the team based on a comprehensive situational analysis (epidemiological, socio-economical and demographical characteristics);
- [T] Organize the provision of health care services according to local needs and priorities identified by health managers (including individual and collective services for health promotion and prevention, diagnosis, treatment and follow up);
- [T] Promote interdisciplinary and multisectorial team work integrating different skills and backgrounds;
- [T] Organize individual and collective actions that seeks to influence the health and disease dynamic and perception targeting individuals and the community.

• *records for local authorities and external M&E*
- [T] Guarantee good data quality in the information system;
- [T] Keep updated the register of families;
- [T] Keep updated the register with records of health professionals activities.

- [CHWs] Work with the population under their responsibility (micro-area) and keep constant contacts with individuals and the community;

Major objectives
- [T] Assume the responsibility and coordination of care plans of their patients beyond the services provided within the unit;
- [T] Guarantee comprehensive and humanized care, including actions for health promotion, prevention, treatment and care;
- [CHWs] Promote actions that integrate the team with the population (i.e.: shared home visits, educational activities);

Main activities
- [CHWs] Inform and direct patients to available health services;
- [T] Satisfy "free demand" of patients, as well as activities planned with the team;
-[T] Seek patients actively across the community;
- [T] Identify actively health problems, vulnerabilities and hazards across the community;
- [T] Guarantee a personalized reception of patients in the unit with individual evaluation and counselling;
- [CHWs] Follow up families through home visits;
-[T, CHWs] Realize health promotion and education activities for the population;
- [CHWs] Foster health promotion and prevention practices in individuals and across the community through home visits and educational activities and groups;
- [CHWs] Follow up families in social programmes, such as *Bolsa Familia*, and any other programme targeting social and economical vulnerabilities.

Community empowerment and intersectoriality
- [T] Enhance intersectorial actions;
- [T] Identify partners and resources in the

	community;
	- [T] Promote the mobilization, participation and empowerment of the community.

As outlined under the NPHCP and summarized in Table 2, CHWs practice and service delivery to individuals and their community is strictly dependent on team work the and attributions of nurses and doctors within the team. This is especially true for what concerns their management as human resources, since health professionals are responsible and should be dedicated to the supervision, organization and evaluation of CHWs' work.

4.3 Implications of CHW role and position for program evaluation

Although team activities are primarily organized around FHUs, which guarantees the decentralization of UHS, universal coverage of PHC services is mainly pursued through CHWs. CHWs are thus essential for the implementation of the entire strategy, in accordance with its principles. CHWs are "key mediators" between the community and the health teams. By being members of the community where they operate, they are aware of culture, customs and language of their population, meanwhile by being health professionals, they are aware of principles, mechanisms and guidelines of the UHS. Health professionals use CHWs information to identify cases at risk that require treatment, but also to include in their patients' assessment information on their living conditions and socio-economic, cultural and environmental factors. At the same time, community members can be alerted of risky situations and behaviours, directed to proper medical consultations, and can benefit of disease prevention and health promotion activities within their homes or in communitarian spaces (MdS, 2012).

The complexity of CHWs' role makes it hard to assess its effects, due to difficulties in disentangling the impact of CHWs programs on population health from the dynamics of factors inherent to the community where they belong, and the arrangements of the formal health system in which they operate, including their relationship with the team they belong to.

The effectiveness of the Brazilian CHW program on population outcomes has been poorly explored and assessed systematically only in one review of 23 studies, published in 2011 (Giugliani et al., 2011). This study shows encouraging results, although with a

low to moderate degree of evidence, on RMNCH outcomes, such as breastfeeding practices, child nutrition, immunization, family health planning, infant mortality, supplementation of iron and vitamins, attendance to prenatal visits (Giugliani et al., 2011).

Despite the lack of rigours and updated systematic reviews of trails on the effectiveness of CHWs, over the past three decades Brazil has improved markedly in a broad range of national health indicators, including access to RMNCH interventions and reductions in maternal, infant, and child mortality and childhood stunting (Victora et al, 2011). This positive trend is certainly supported by major advancements in the overall progress and socio-economic condition of the country (Victora, 2011). However, the use of secondary data and statistics in several researchers allowed to found a significant, positive and temporal relationship between the inception and expansion of FHS coverage, which includes the implementation of CHWs program, and the reduction of maternal and child mortality, especially under 5 mortality (Zanchetta et al., 2009; Aquino et al., 2009; Rocha et al., 2009; Victora et al. 2011).

4.4. The challenges of RMNCH in Brazil: the Brazilian paradox and the role of CHW programs

In Brazil, universal and free access to comprehensive pregnancy, delivery and neonatal care is guaranteed by the health system since 1988 (MdS, 2017a). However, large regional disparity and persistently high maternal and perinatal mortality in many states (DATASUS, 2016) are a matter of concern for authorities and civil society organizations.

Under-five mortality rate decreased from 53.7 to 14.4 deaths per 1,000 live births between 1990 and 2013 (DATASUS, 2016), but maternal mortality rate at 64 deaths per 100.000 live births (2011) and neonatal mortality rate at 11.1 deaths per 1000 live births (2012), are still unacceptably high, particularly in the North and Northeast regions and in lower social classes, and show a slow reduction pace (MDG, 2014; Lansky et al., 2014; WHO, 2015b). These data contrast with very high levels of institutional births assisted by skilled professionals (99%) and high attendance rate to antenatal visits (90% of women receive four or more visits) (Lansky et al., 2014; DATASUS, 2016) and illustrate the situation known as "Brazilian perinatal paradox" indicating that the main challenge to be addressed is the insufficient quality of RMNHC (Lansky et al., 2014; Diniz, 2009).

For what relates to primary health care services, regional variations on population health outcomes and service delivery between and within states and municipalities still reflect major geographical inequalities (Mullachery et al., 2016; Dourado et al., 2016; Victora, 2011). Main explanations are connected with the heterogeneous performance of health services and the quality of their implementation (Nunes et a., 2014; Theme Filha et al., 2016; Dourado, 2016), as well as in a low utilization of services across vulnerable population groups, which are characterized by strong disparities in socioeconomic conditions and living contexts, quality and expectancy of life, disease prevalence and incidence, and diffusion of risky and harmful health behaviours (Boccolini et al., 2016; De Azevedo Barros et. al, 2016; Dourado, 2016; Szwarcwald et al., 2016).

In order to tackle this paradoxical situation, the strategy must address two different levels and dimensions of the system: the equity and quality of delivery care on one side and the equity and quality of primary care on the other (Victora et al., 2011). While the first aspect is considered as a priority (UFMA, 2015), although effective intervention strategies are still not implemented, the second dose not seem to gain momentum.

Improving the implementation of health services, as well as health related behaviours and practices among the most disadvantaged and at risk population groups, particularly family planning, prenatal and post natal care seem crucial to further advance on health outcomes. For making the second strategy effective, the role of CHW programme may be crucial if adequately supported.

5. A systemic approach to CHWs' performance analysis and improvement: the use of logic models

System thinking in programme description, design, evaluation and improvement has been recently applied to CHW programmes (Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015).

The evidence provided has mainly addressed two aspects connected with CHWs' performance. The first is related to the design of CHW programmes, and is aimed at helping policy makers to understand which components of the health system should be addressed to improve the effectiveness of CHW programs (Naimoli et al., 2014). The second with implementation obstacles and enablers of CHWs' performance, which could

be used for comparisons and evaluations of existing CHW programs and the definition of best approaches for programme strengthening (Glenton et al., 2013; Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015).

With regards to the Brazilian context, as previously explained, CHW program is highly integrated within the formal health system and the community. However, an analysis of its implementation process, its challenges and opportunities within a comprehensive and interactive systemic perspective is missing. This analysis would improve the understanding of Brazilian CHW programme, and therefore the evidence basis for improving it.

As discussed earlier, all quality improvement attempts are complex interventions, since they need to be based on a sound situation analysis of the mechanisms underlying gaps and failures and to mobilize multiple independent and interdependent actors at different levels. As no intervention is unfold in a vacuum, quality improvement interventions must also be tailored to the specific context and dynamics.

To facilitate the analysis of CHWs' performance as a complex health sub-system, and subsequently identify best options to improve its quality, CHWs programme can be theoretically approached and visualized with logic models (Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015).

Logic models and maps, also referred to as change models or theories of change, can be used to describe visually the theory, or rationale, underlying a program, as well as its functionality and implementation within a given context (Mayne, 2015). Funnel & Rogers (2011) defines a logic model as "*an explicit theory or model of how an intervention, such as a project, a program, a strategy, an initiative, or a policy contributes to a chain of intermediate results and finally to the intended or observed outcomes*". They articulate assumptions and hypotheses upon which a certain program performs and attempts to reach its outcomes, and to set out the causal connections that link program inputs (that is its resources, actors and structural elements) to its outcomes (whether observed, measured or expected). Additionally, they can be used to incorporate and unfold mediators of effects between inputs and outcomes, causes, consequences, opportunities and risks, as well as proximal mechanisms derived by contextual elements within or beyond the control of the program, or to portray how specific inputs or causal links can be beneficial or harmful for the overall program

performance (Rogers, 2008; White, 2009). These methods allow to articulate the "black box" of program processes according to different levels of complexity, which are dependent, amongst others, by the type and quantities of program elements, actors and interactions (Chen, 2015).

The development and use of a logic model to describe CHWs' performance within the systems where they operate can help understand influencing factors and their mechanisms. Hopefully, a logic model specifically tailored on the Brazilian reality will help to identify hypothesis and best policy opinions for CHW program strengthening and quality improvement of CHWs' performance in that specific context.

Objectives

The objectives of the research are:

1. To identify and describe factors that influence positively or negatively CHWs' performance by selecting, appraising and synthesizing qualitative research studies dealing with CHW program implementation in Brazil.

2. To place the review findings within a theory-driven logical model that would improve the understanding of interactions between the factors identified and CHWs' performance.

3. To provide a process evaluation of a community based intervention trial to improve the effectiveness of home visits (HVs) carried out by CHWs to pregnant women and mothers for exploring, understanding and interpreting, from an health system perspective, its implementation, impact mechanisms and results.

4. To draw, within the process evaluation, information on barriers and facilitators to CHWs' performance, in order to check the validity of the logic model displaying CHWs' performance in Brazil developed in the first part of the research.

5. To identify and systematize policy options to improve the performance of CHWs across all their attributions and tasks.

6. To propose policy packages which, assuming the same objective of the intervention trial, i.e. to improve CHWs' performance in RMNCH, make an attempt to overcome its design and implementation gaps.

Chapter I – Systematic review of qualitative studies carried out in Brazil. Development of a logic model for CHWs' performance

1. Background and Objectives

As mentioned in the background section, in order to fully unfold CHWs potential within the primary health care strategies in Brazil, there is the need of an informed picture of real-life dynamics underlying CHW program implementation in this specific context to guide evidence-based and contextualized quality improvement interventions.

Qualitative studies are particularly suitable not only to identify factors involved in success or failure of program implementation, but also to unveil the underlying complexity of mechanisms and connections that shape CHWs' performance and practice (Sandelowski, 2004; Luna-Reyes & Andersen, 2008; Weiner et al., 2011). The are several qualitative reviews on CHW program in the international literature (Glenton et al., 2013; Kok et al, 2014; Kok et al., 2015). However, as confirmed by cross-checking the references of these reviews to spot studies made in Brazil, these reviews only included works written in English, thus excluding the vast majority of the evidence produced in Brazil, where researches on this issue are usually published in Portuguese.

Furthermore, these reviews include studies on diverse types of CHWs and CHW programs established in different countries, the analytical approach adopted is mainly comparative and results have been used to develop theories about CHW programs by extracting similarities and differences across a variety of settings. The search of a common analytical denominator across complex and highly contextual phenomena, such as CHW program structures and their implementation, might risk to level out important aspects of local dynamics, adaptations, needs and processes.

Therefore, although these reviews represent an extremely valuable source of information and inspiration, their usefulness for Brazilian policy makers, program implementers and researchers who seek a higher degree of understanding of their specific context, may be somewhat limited. This is particularly true since the Brazilian CHW program, which has over a quarter of a century history, is implemented rather uniformly across the whole country, and represents globally one of the programmes with the highest degree of integration within the health system (Zulu et al., 2014). Therefore, it would benefit from a context specific analysis.

To our knowledge, despite the large amount of qualitative studies involving CHWs in Brazil, there have been no attempts to synthesize the available evidence.

The objective of our review is precisely to collect and analyze this evidence, in order to provide a comprehensive picture of the main opportunities and challenges in program implementation. Due to the richness of the Brazilian history and experience with CHWs and CHW programs, and the rising international attention to them, this exercise could also benefit other counties who are interested in integrating CHWs into their health system, or implement a national, large-scale CHW program.

The scope of the review, by collecting the experiences of the main stakeholders involved and particularly of CHWs and other FHT members, is initially descriptive. However, since these experiences by themselves include explicitly elements of interpretation of the underlying dynamics, or provide information requiring interpretation, we made an attempt to systematize the results of the review within a logical explanatory model of CHW program implementation dynamics, as a first step for developing an evidence base theory of change for policy making at all levels.

Based on these assumptions and intentions, the objectives of this chapter are:

1. To identify and describe factors that influence positively or negatively CHWs' performance by selecting, appraising and synthesizing qualitative research studies dealing with CHW program implementation in Brazil;

2. To place the review findings within a theory-driven logical model that would improve the understanding of interactions between the factors identified and CHWs performance.

2. Methods

2.1 Criteria for considering studies for inclusion in the review

2.1.1 Type of studies

Studies considered for inclusion had to be based on qualitative designs and methods for data collection and analysis.

Studies were excluded if data were collected using qualitative methods, but results were presented providing quantities, or if study design was a mix of methods and it was not possible to disaggregate results, or, lastly, if data used in research were secondary data, such in the case of systematic reviews. No restrictions were applied for the selection of the qualitative design (i.e.: case studies, ethnographic researches, phenomenology), nor for the data collection method (i.e.: focus groups, observations, structured and semi-structured interviews) or data analysis (i.e.: content analysis, thematic analysis, narrative presentations).

2.1.2 Study contents

Studies were considered if they included direct or indirect experiences, attitudes and perceptions of any of the stakeholders involved with CHW program implementation and performance in Brazil. Participants could include CHWs, health professionals working with CHWs in FHTs, health managers at any institutional level, members of the communities, such as patients, community leaders and representatives.

To be included in the review, studies had to explore factors and dynamics reported as having an impact on CHWs' performance. Factors could be related to the formal health system, especially to specific features of the CHW program, or to the community, its members, dynamics and features, which will be hereafter collectively referred as the "community system" (Schneider, 2016). They could be institutional, cultural, socio-economical or behavioral, and they could be interlinked in various ways with structural or procedural elements of CHW program implementation.

2.1.3 Search methods

Electronic searches

Studies were searched on 19.09.2017 across five databases, three with international reach, and two mostly based on literature from South America, including Brazil:

- EMBASE, through Ovid;

- MEDLINE, through Ovid;

- Global Health, through Ovid;

- LILACS, through BVS;

- SciELO, through BVS.

Due to the complexity and breath of the study, the search strategy aimed at increasing the sensibility of the search rather than its specificity, thus prioritizing its ability to include relevant studies rather than excluding irrelevant ones.

The search string was built around two main concepts: CHWs and Brazil. Terms used to describe CHWs included synonyms, such as community and lay health agents and workers, which were included in the string in both English and Portuguese. The same full string (Table 3) fitted the requirements of all databases used, so no adaptations were needed.

Table 3 Search strategy used for MEDLINE

(agente* comunitario*) OR (community health worker*) OR (lay health worker*) OR (agente* de saude) OR (community health agent*)) AND (brasil OR brazil)

Filters were used to include only studies that were published after 2002, when CHWs were officially formalized as health professionals within the CHW program in Brazil. The search was not restricted by any language requirements to allow English, Portuguese and Spanish articles to be included. Studies were only included if they were published in peer-review journals. Grey literature was excluded from the review. Hand searching of the reference lists of studies included was used as an additional source.

2.1.4. Data collection and analysis

Selection of studies

Studies were first screened through titles and abstracts and excluded when irrelevant, while uncertain and potentially relevant studies were retrieved in full text for further screening against a set of inclusion criteria (Table 4).

Table 4 Criteria considered for inclusion of studies

- Based on a qualitative design, data collection and analytical methods; - Focused on CHWs' performance and at least one of its determinants; - Set in Brazil; - Published between 2002 and 2017.

The screening process, the selection and assessment of records and full texts was conducted only by one reviewer due to lack of other suitable professionals available for this purpose.

2.1.5 Data extraction and management

Data extraction was performed by the same author who screened and selected studies, for the same reasons previously presented.

Two different standardized data extraction forms were developed and used to retrieve relevant information from selected studies. The first was used to extract main study identifiers: study ID, author's name, year of publication, study setting, main objective and study participants. The reporting of study settings was restricted to the Brazilian State where the research was held, as this information was thought to be sufficiently detailed for contextualizing the evidence. Study participants, who include the people interviewed, were extracted using a five category classification: CHWs, health professionals working in FHT, health managers of any level, users of services/ patients, and other stakeholders.

The second data extraction form was informed by key international evidence and conceptualization of barriers and facilitators to CHWs' performance (Glenton et al., 2013; Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015), and further detailed by theoretical models for approaching health systems and programs (WHO, 2007b), as detailed in the background section of our work. International literature on CHWs shows that their programs are frequently embedded in the formal health system as a health sub-system, and that their performance is influenced by and interrelated not only with it, but also with the community system, that is the set of individual and collective actors, dynamics and contextual features of their communities (Figure 3).

Figure 3 CHW program, formal health system and community system
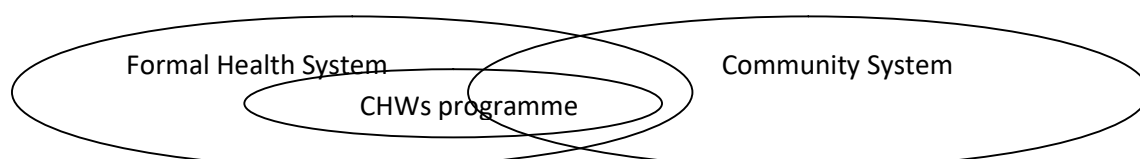
While the latter includes aspects related to the socio economic and cultural context where CHWs perform their actions, the former could be described using the six health system components of the WHO "building blocks" model (service delivery modes; human resources; health information systems; infrastructure equipment and logistic; financing; leadership/governance) (WHO, 2007b). Lastly, according to the literature, different elements of these two systems can impact positively or negatively on CHWs' performance, by acting as facilitators or a barriers to CHWs' work (Glenton et al., 2013, Kok et al., 2014; Kok et al., 2015).

Based on these assumptions, the second step of data extraction was organizing the information retrieved from each study around a preliminary thematic framework based on three categorical orders (Table 5).

Table 5 Preliminary thematic framework for the classification of factors affecting CHWs performance

System	Component	Effect
Formal Health System	- Service delivery; - Human resources; - Health information systems; - Infrastructure and Equipment; - Financing; - Leadership/governance	- Facilitator - Barrier
Community system	- Socio-economic context; - Culture	- Facilitator - Barrier

At the end of the data extraction process, each factor retrieved from selected studies, and described as an influencer for CHWs' performance, was classified as belonging to the health or community system, further detailed into a more specific categorization under each system, and finally accounted as a facilitator, a barrier or both for CHWs.

During this second stage of data extraction, the information retrieved were *verbatim* quotations of full sentences and paragraphs from direct study participants experiences and opinions, or authors' views and interpretation well supported by evidence. These data were found mainly in the result section of the studies, or, occasionally, in their discussions, depending on authors' choice for presenting their findings. As it has been acknowledged in qualitative synthesis, authors' interpretations of findings, when well supported and analyzed, represent the data that can inform the review (Sandelowski & Barroso, 2007; Glenton et al., 2013).

2.1.6 Quality assessment of the studies

The quality of primary studies included was assessed using the Critical Appraisal Skills Program Checklist quality-assessment tool for qualitative studies (CASP), which considers methodological challenges in relation to the following domains: research aims, methodology, research design, recruitment strategy, data collection, data analysis, reflexivity, ethical considerations, findings, and value of research. At the end of the assessment, each study was classified as of "high", "medium", or "low" overall quality (Dixon-Woods et al., 2007).

No studies were excluded as a result of the quality assessment for three reasons. Firstly, as for data selection and extraction, the assessment was undertaken by one researcher, which could represent a limitation to the overall assessment. Secondly, methodological standards and procedures for qualitative assessment of primary studies in qualitative reviews are far from being established and are still debated. Lastly, it has been argued that the better is the methodological quality of a primary study, the greater is its contribution to the development of review findings, thus leading to ground the final statements on the most convincing sources (Atkins et al., 2008). The methodological rigor of each study was rather used to assess its contribution to the overall confidence of each finding of our review, in line with similar qualitative reviews (Glenton et al., 2013; Bohren et al., 2004).

2.1.7. Appraisal of certainty of review findings

Assessing the degree of certainty of findings of systematic reviews on the effectiveness of a health intervention is crucial for the reliability, and consequently the use, of their findings by the community of researchers and decision makers and it is recommended as a standard procedure by the Cochrane Group, for example through the use of the GRADE tool (Guyatt et al., 2011).

Similarly, evaluating the overall confidence of qualitative syntheses would guarantee more reliability and precision to the findings, thus improving their usefulness to evaluate the acceptability and feasibility of an intervention, as well as of other implementation steps (Glenton et al., 2013).

As mentioned above, methods and tools for the overall assessment of qualitative reviews have not yet been sufficiently developed. In this review, each review finding in relation to factors that could positively or negatively impact on CHWs performance is assessed adopting the CerQual (Confidence in the Evidence from Reviews of Qualitative Research) approach (Lewin et al., 2015). In line with the work of Glenton et al. (2013), Colvin et al. (2012) and Bohren et al. (2014), the CerQual approach is based on the combination of a two step evaluation undertaken for each review finding: the methodological quality of individual studies used as data sources and the coherence of those sources. The first step was described previously and is based on the assessment of each qualitative study supported through the use of CASP. The second step was aimed at exploring the strength of each final statement, i.e. how well each review finding is grounded on its sources.

Based on the assessment of the methodological quality of individual studies contributing to each review finding and the coherence across all data, the confidence of the evidence for each review finding was assessed as "high", "moderate", and "low".

2.1.8 Data synthesis

This objective was pursued through an iterative process that constantly shifted the focus of the analysis from single studies to cross-study comparisons, in order to identify relevant information and patterns across data and build a "best-fit" framework for their synthesis and analysis. The model adopted for this purpose was a logical thematic model (Carroll, Booth & Cooper, 2011; Dixon-Woods, 2011; Gale et al., 2013).

The model had to fit the reality of CHWs' performance within the context and features of CHW program implementation in Brazil, and to take into account key international findings on facilitators and barriers of CHWs performance.

The development of the logic thematic model had to consider key information sources as a point of departure, and still be responsive to contextual findings. For this reason, content-analysis and thematic synthesis were approached with both deductive and inductive epistemological approaches (Ritchie & Lewis, 2003; Thomas & Harden, 2008; Barnett-Page & Thomas, 2009; Elo & Kyngäs, 2008). Deductive strategies were used to account for the extensive work available on barriers and facilitators to CHWs' performance at international level, including analytical and theory-driven frameworks

that could not be ignored for their relevance to our work, for being facilitators of the work and for providing an evidence-based ground for comparisons of our findings with international research. At the same time, inductive techniques were used to allow for a better adaptation of the review findings to the Brazilian health and social context. Inductive ways for data management provided a certain degree of freedom to build an analytical model that best portrayed the data collected.

The main assumptions behind the development process of the logical framework were described in detail in the background with full references, and include the following:

- CHW program in Brazil is highly integrated within the overall health system and could be defined as one of its sub-sets within the primary care services (MdS, 2012);

- CHW program components and mechanisms are outlined in MoH official documents, which formally define the health system building blocks for this sub-set of the health system (MdS, 2012);

- CHWs performance is interlinked with the formal health system (including CHW program) and the community system, and their relationships are dynamic, non-linear and highly contextual (Schneider, 2016);

- The direction of causal links connecting structural features and actors of these two systems (inputs) with CHWs' performance can be positive or negative, and can be described within a logic model of complex causal mechanisms (Naimoli et al, 2014).

Based on these epistemological methods and key assumptions, the logic thematic model was developed in five stages (Caroll et al., 2011):

Stage 1. Familiarizing with the studies included for revision and making a preliminary comparison with international literature on the issue;

Stage 2. Developing a preliminary thematic framework for data extraction (see Table 5) based on *a priori* set of categories against which to map and organize data retrieved from included studies;

Stage 3. Coding the data extracted under the categories and themes previously defined, and identifying new categories and themes in order to index relevant information that were not captured within the preliminary model and to expand the preliminary framework into a more comprehensive one (Table 5);

Stage 4. Charting the indexed data under each relevant category and theme and developing a narrative synthesis for each data sub-set charted coupled with a summary table of findings;

Stage 5. Mapping categories and themes within a logic model attempting to present a comprehensive and dynamic display of interconnections between each category, themes and their impact on the review focus (CHWs' performance).

The first four steps were mostly aimed at categorizing and synthesizing data through the organization and description of factors that were found to be shaping CHWs' performance, while the fifth was aimed at interpreting and analyzing the mechanisms of influence of these factors during CHWs program implementation.

2.1.8.1 Advanced thematic framework: code book

Stage 3 of the iterative process adopted in data synthesis led to the development of a new "code book" which includes a greater range of categories and sub-categories that were used for indexing all data retrieved from included studies. If compared to the preliminary thematic framework (Table 5), this advanced version was wider, more comprehensive and fitted for the organization of the evidence available. The final "code book" was used to structure the evidence synthesis and contributed to the development of the logic thematic model as described in Stage 5.

The code book was organized around general categories furthered structured by intra-class and inter-class hierarchies and logic connections (or causal pathways) of influence on CHWs' performance.

The two major categories defined within the advanced framework were "systemic inputs" and "mediators of effects".

The category "systemic inputs" redefined and expanded the *a priori* classification of "system" and "components" within the preliminary framework (Table5) and includes all factors that are considered "inputs" for CHWs' performance and belong to one of the two main systems, the formal health system and the community system. When factors were found to belong to the same category of "systemic inputs", they were organized hierarchically in sub-groups to allow broader themes to include their sub-groups. For example, the sub-category of the "health system" included the category of "human

resources" in a lower hierarchical level, since human resources are a part of the health system (WHO, 2007b).

The full list of categories within the "systemic inputs" group can be found in Annex I, together with the overall code book, and, since "systemic inputs" are the main focus of this review, details will be provided in the result section.

The second major category used for indexing data was "mediators of effects". During data extraction process, it was possible to notice that "systemic inputs" were seldom directly connected with CHWs performance, and that their influence was often mediated. Mediating factors were found to be causally interconnected with both "systemic inputs" and CHWs' performance.

The relationship between "systemic inputs", mediators and performance is defined by causal pathways and temporal connections. Consequentiality across categories was reflected into a hierarchical organization of data, where factors that logically came first, such as "systemic inputs", precede the others (Table 6). The organization in causal hierarchies was crucial for mapping factors during Stage 5 of data analysis.

Table 6 Main categories and hierarchical organization

	Across categories →	
	Level I	**Level II**
Within categories ↓	Systemic inputs*	Mediators of effects
	System	
	Inputs	
	Factors	
	Sub-categories	

*see Annex I for more details

2.1.8.2 Mediators of effect

Deeply focusing on mediators of effects is not the objective of this review, rather their identification and summary profile a necessary intermediate step. Their recognition is crucial for an appropriate organization of findings within a logic thematic model, which can portray the complexity of dynamics and causal mechanisms connecting contextual factors to CHWs performance along the CHWs' program implementation process (Naimoli et al, 2014).

The identification of these sub-groups was the result of the iterative process of data extraction across the included studies, and their definition was backed up by matching the evidence from official MoH documents on CHW program, its underlying assumptions, structure and organization (MdS, 2012), and key findings of the literature on CHWs' performance (Naimoli et al., 2014).

If systemic inputs are the focus of this review, elements and processes that enables their connections and concrete translation with CHWs' performance should be stated and clarified for a better understanding of the how and why systemic factors can turn into facilitators or barriers. This clarifying step could boost a more constructive and informed work on programme improvements, although for its complexity would maybe require a separate study.

Within this review, three major mediators were identified, which involve the main participants underlying the assumptions, structure and organization of CHWs programme in Brazil from an health system perspective (MdS, 2012), namely CHWs, FHTs' health professionals (especially nurses and doctors) and the overall FHT as a group of individuals. These mediators are represented by CHWs' knowledge, attitudes and practices (KAP); FHTs' health professionals knowledge, attitudes and practices, and finally on the overall team's knowledge, attitudes and practice, which will be referring as team work. These dimensions embrace the behavioral and emotional aspects, as well as the cognitive and the practical ones of subjects involved in CHWs' work. While the formers attempt to capture the connection between systemic inputs and CHWs' performance through the lens of individual attitudes to the surrounding environment, the second and the third concern the relevance and appropriateness of people in terms of their knowledge and practice, respectively, for supporting an optimal performance. Attitudes, knowledge and practice were found to be connected to the objectives and mission of CHWs' programme, to its organization and instruments, up to the expected and achieved final products (Naimoli et al., 2014).

CHWs knowledge, attitudes and practices

Across all studies, CHWs' KAP were found to lie between systemic inputs and CHWs' performance. The quality of CHWs' activities was found to be the result, amongst other factors, of the appropriateness of individual CHWs' KAP for their tasks and mission. At the same time, however, CHWs' KAP were also found to be subjected and influenced by

external systemic inputs. Within the CHW program in Brazil, the features that were found to be relevant within CHWs' KAP are described in Box 2.

Box 2 CHWs' KAP relevant within the CHW program in Brazil

CHWs knowledge:
- Biomedical principles and causal mechanisms behind the health and disease process;
- Social determinants of health and causal mechanisms behind the health and disease process;
- Communication and relational principles;
- Context, including epidemiological and community profile and dynamics;
- Ethical professionalism and boundaries of CHWs mission.

CHWs attitudes:
- Professional motivation;
- Professional frustration and stress;
- Personal self-esteem;
- Professional confidence and autonomy;
- Interest in professional development;
- Engagement with the job and work environment;
- Openness to new tasks and working methods;
- Openness to self and team evaluation;
- Attitude to team work;
- Attitude towards community of users (judgment and ties).

CHWs practice:
- Properly carrying out tasks;
- Planning work;
- Work in team;
- Communicate appropriately with patients;
- Provide adequate and comprehensive counselling (oriented to treatment, disease prevention, health promotion and education);
- Translate theoretical knowledge into practice;
- Manage ethical dilemmas and inter-professional issues;
- Understand and diagnose problems across the community;
- Problem solving towards personal and community issues;
- Link other services and sectors.

FHTs knowledge, attitudes and practices of other health professionals

The inclusion of the category "FHTs KAP of other health professionals" under "mediators of effects" was backed up not only with the analysis of the evidence available within the review, but also with the formal inclusion of FHTs as a key component of CHW program in Brazil.

Under the NPHCP, CHWs' work is by definition strictly dependent on the FHT whom they belong, since key activities linked with CHWs, such as their management and

coordination, and team work, are attributions of the health professionals working in team with them, especially nurses and doctors. Therefore, CHWs' performance should be analyzed also in its relationship with the whole FHT and its members.

Similarly to CHWs' KAP, however, FHTs KAP were found to be shaped by external systemic inputs and therefore organized under this broader category. Within the CHW program in Brazil, the features that were found to be relevant for FHT's KAP are described in Box 3.

Box 3 FHTs' KAP relevant within the CHW program in Brazil

> **FHTs knowledge**:
> - Biomedical principles and causal mechanisms behind the health and disease process;
> - Social determinants of health principles and causal mechanisms behind the health and disease process;
> - Communication and relational principles;
> - Context, including epidemiological and community profile and dynamics;
> - Ethical professionalism and boundaries of CHWs' mission;
> - Pedagogical, educational and supervision principles and methods.
>
> **FHTs attitudes:**
> - Professional motivation,
> - Professional frustration and stress,
> - Engagement with the job and work environment;
> - Attitude to team work;
> - Leadership;
> - Attitude towards community of users and CHWs (judgment and ties);
> - Willingness to support and facilitate CHWs' work.
>
> **FHTs practice:**
> - Properly carrying out tasks;
> - Leader, supportive and manage groups;
> - Using effective training methods and to contextualize educational objectives;
> - Supervising CHWs work;
> - Supporting a holistic view of health and disease process;
> - Strengthen soft skills (relational and communicational skills) in team members;
> - Understand and value CHWs' roles and responsibilities.

Team work

For all reasons described previously, within CHW program in Brazil, "team work" was found to be crucially linked with CHWs' performance, but also strictly influenced by systemic inputs. It was under these circumstances that it was considered for inclusion as a sub-category of "mediators of effects".

Within CHW program implementation, the features that were found to be relevant for team work are described in Box 4.

Box 4 Team work features relevant within the CHW program in Brazil

- Clear distribution of work and responsibilities;
- Clear and participatory planning and prioritization processes;
- Existence of CPD plans and activities, incl. multi-professional;
- Networking and collaboration with other services and sectors;
- Uniformity of vision of goals and services;
- Opportunity and space for open discussion;
- Existence of improvement cycles (act-reflect-act);
- Shared case review and problem solving;
- Capacity and power of ensuring planned referrals;
- Capacity of developing a reliable community situational analysis;
- Capacity of developing or contributing to community/micro-area plans.

2.1.8.3 Logic connections between systemic inputs and CHWs' performance

Coherently to what was defined within the preliminary thematic framework (Table 5), during Stage 3 of data synthesis, logic connections between systemic inputs and CHWs' performance were categorized as "effects" and further classified as "barriers" when inputs were found to hamper CHWs' performance directly, or through their indirect influence on mediators, or, contrarily, as "facilitators" when they ease it.

During Stage 4 of data synthesis, however, it was found that the same input could behave differently, and act contradictorily on CHWs' performance as a facilitator and as a barrier across all evidence collected. To account for this bidirectional relation, logic connections between systemic inputs and CHWs' performance were further classified as "homogenous" or "heterogeneous".

Often, but not always, it is not the factor itself which acts as a barrier or a facilitator to CHWs' performance, but rather the way the corresponding health system component/function is implemented in practice. For example, the presence of adequate support and supervision is a facilitator, its absence or inadequacy is a barrier. To account for this, we used the following classification in our narrative summaries:

↕ when the same factor acts contradictorily irrespective of its implementation;

↑↓ when different forms of implementation can turn the same factor into a barrier or a facilitator;

↑↓ when the prevailing effect emerging from studies is positive;

↑**↓** when the prevailing effect emerging from studies is negative.

Logic connections were classified as homogeneous when the same input had similar effects at CHWs, FHTs or community level, and thus on CHWs' performance. That is, the same alterations of factors and their features consistently perform across all settings and experiences as a facilitator or barrier for CHWs performance. For example, the initial training for CHWs was defined as a facilitator when promptly delivered, and as a barrier when delayed or missing. They were classified as heterogeneous if the same input had contradictory effects at CHWs, FHTs, team work or community level, and thus on CHWs' performance. That is, the same alterations of factors and their features perform differently across settings and experiences and could act simultaneously as a facilitator or barrier for CHWs' performance. For example, work and living in the same place was found to favor CHWs practice, and at the same time to be an obstacle for it.

3. Results

3.1 Description of studies

The search strategy identified a total of 4820 records, mainly retrieved from databases mostly including Latin American journals (Figure 4). 4305 articles were screened for titles and abstract and for 302 records full text was considered for inclusion. Fifthly studies were matching with the review inclusion criteria and used for qualitative synthesis (see Annex II, for data extraction form).

Figure 4 Study flow diagram of included studies

In the flow diagram:

Records identified through database search: 4820
[EMBASE = 223; MEDLINE = 212; GHL = 184;
LILACS = 3294; SciELO = 907]

→ Duplicates removed: 515

Records screened for titles and abstracts: 4305

→ Records excluded based on titles and abstracts: 4003

Full text of records assessed for inclusion: 302

Studies included for qualitative synthesis: 50
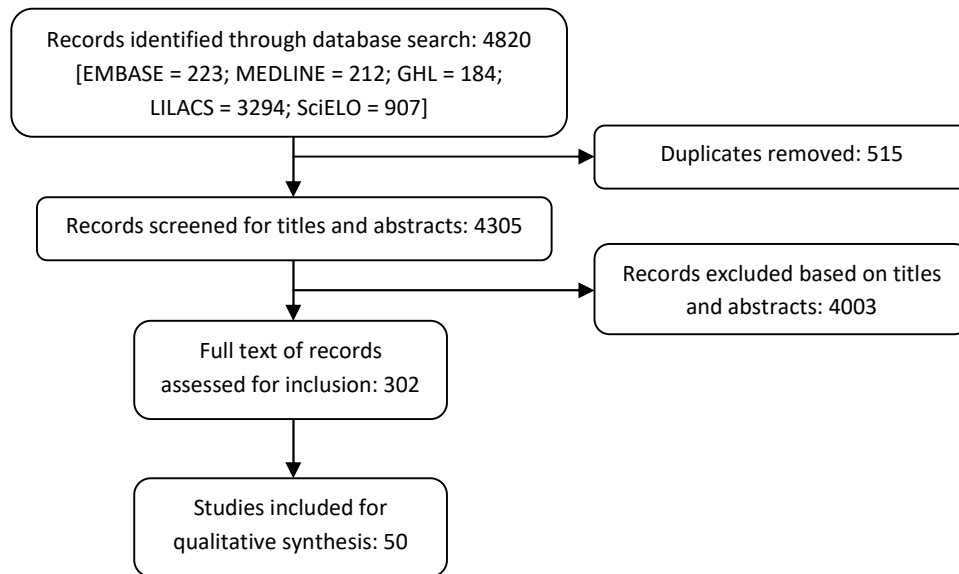
The majority of them were published between 2006 and 2015 (Figure 5), and were mostly set in the southern regions of Brazil (73%).

Figure 5 Number of studies published per year since 2002
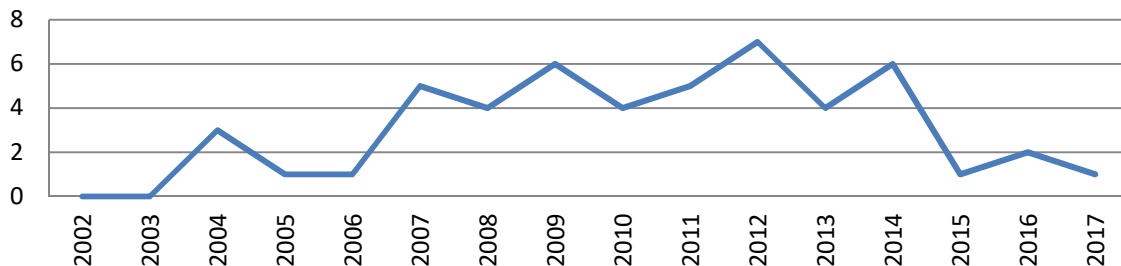
In almost all studies (90%), CHWs experiences, opinions and practice were collected, while health professionals belonging to health teams were involved in less than a half of them (44%). Community members and health managers views were represented respectively in 18% and 12% of the studies analyzed. Other respondents, such as external technical groups of health professionals, were seldom involved (4%).

The quality of included studies

Almost all studies included described their criteria for selecting participants, provided details on the study context and methods for data collection and analysis, although very often these descriptions were limited and brief. The majority of studies relied only on one method for data collection, which was generally focus groups or interviews.

Reflexivity was poorly considered, and only included in a very limited set of studies. Findings were generally supported by evidence and presented with an acceptable level of detail.

Confidence of the review findings

Moderate was the level of confidence assessed for the majority of findings, while only a little numbers of them were considered to hold "high confidence". High confidence was included those findings that were supported by a wide range of studies that despite begin mainly of moderate to low quality were found to be highly consistent in the evidence provided. Moderate findings were supported by studies with similar quality and coherence, but in a more limited number. Low confidence was only assigned to few findings statements due to the paucity of the evidence in their support (see Annex III, for summary results on confidence).

3.2 Narrative synthesis of studies

A narrative synthesis of findings is reported in this section for all systemic inputs retrieved from the literature. Findings are organized by their categorical group, and coupled with a summary table where each input indexed, and its sub-categories, are represented with their mediators of effects and their logical connections with CHWs' performance. Logical connections are reported under the column "L.C." as previously described in methods (see paragraph 2.1.8.3). Lastly, each factors is accompanied by the references of the studies bringing specific supporting evidence.

3.2.1 Systemic inputs from the formal health system

3.2.1.1 Human resources

Factors related to human resources were mentioned in almost all studies as crucial inputs for CHWs' performance. Amongst their features and components, those found to alter it were: CHWs' selection criteria and process, CHWs' working conditions and the composition of family health teams.

CHWs selection criteria and process

CHWs selection criteria and process included three main aspects: selection interview, requirements on educational background and residency (Table 7).

Table 7 Summary of findings on CHWs' selection criteria and process

Factors	Mediators of effect	L.C.	References
Selection interview	CHWs' KAPs It increases the opportunity to select motivated candidates.	↑	25
Educational background	CHWs' KAPs It increases the presence of young and better educated CHWs, who can be more flexible to new working challenges. In turn, however, their higher education may mean less personal experience in low income communities .	↕	8; 24; 25
	Systemic inputs: community Community members may identify themselves less with better educated CHWs.		
Residency A. Job opportunity in precarious contexts; B. Close ties between CHWs and patients; C. Work space is the living space	CHWs' KAPs A. Being recruited as CHWs can be experienced positively as an honour, or negatively as the only working option, with consequences on CHWs' commitment; B/C. could positively motivate CHWs to work and help peers and friends, but also negatively influence their attitude towards personal enemies within the community, generate frustration for not being able to solve problem, and lack of privacy; B/C. could benefit CHWs' knowledge of the overall social context and values and relevant practical skills, although does not guarantee better management of individual cases.	↕	1; 2; 3; 5; 6; 8; 10; 12; 13; 14; 19; 23; 24; 25; 27; 28; 29; 30; 31; 33; 38; 39; 40; 42; 43; 44; 45; 46; 50
	Team work B/C. could favour team management of patients through better connections between CHWs		

	and community.		
	Systemic inputs: community B/C. could either strengthen or weaken social recognition, understanding, trust, access and penetration of CHWs.		

The interview process for selecting CHWs, which nowadays is a compulsory requirement under the NPHCP, was mentioned in one study as a positive input for two reasons: because it increased the likelihood of hiring a motivated person and because it reduced the space for political interferences in the selection of suitable candidates. However, the confidence in this statement should take into account that the supporting evidence is limited.

The effects of specific educational requirements for applying to CHW posts were only reported in a few studies. Educational background was found to have contradictory effects for CHWs' performance. On one side, it allows the selection of younger and better educated persons within the community, and consequently facilitates the recruitment of candidates who are likely more prone to acquire new knowledge and skills and less resistant to change their own values and beliefs accordingly to scientific evidence, differently from older CHWs, whose educational background and flexibility are usually lower. On the other side, the younger age reduces the depth of personal experience spendable vis-à-vis with the community, for example younger and more educated CHWs might understand differently from the older ones what does mean to be a mother and take care of a family.

Being recruited within the community where CHWs are supposed to serve is currently a requisite under the CHW program selection procedures. However, the residency was found to have contradictory implications for CHWs' attitudes, knowledge and practice and consequently on their performance, especially with respect to their mutual relationships with community members as individuals, and as a collective group of persons.

Being residents in areas characterized by poor socio-economic conditions increases the likelihood that being employed as a CHW may represent one of the few job options available for community members, and be the main reason for applying for a CHW position. When this occurs, CHWs are at increased risk of poor professional motivation

and commitment, which leads to rapid turn-over when other job opportunities may appear; on the other hand, individuals that are recruited might feel honored, reinforce their self-esteem and identity.

Another relevant dynamic emerging from the literature is that working for neighbors and friends is reported to increase the sense of responsibility and empathy of CHWs towards their patients and community needs, but also, quite often, to cause emotional and psychological exhaustion, due to their inability to be always present, overcome social injustices and poor living conditions, or face the justified and unjustified frustrations of patients' expectations. Moreover, these strong emotional and geographical ties with the community lead CHWs to suffer for a lack of privacy and personal freedom due to blurred boundaries between their private life and their public and work commitment.

Additionally, holding strong ties with community members could bias CHWs' attitudes, knowledge and practice with case management of individual patients. For example, CHWs might avoid to provide full orientations and disclose information to other team members for fear of creating personal enemies within their community and generate conflicts between work and their private life. Similarly, patients may refrain to reveal useful information related to their condition, as they might worry about the disclosure of sensitive issues to a community peer. At the same time, however, living and working in the same area was also reported to positively influence CHWs' performance for a variety of reasons. If the community has to be seen as a collective body of individuals, being part of that group provides CHWs with a deeper knowledge of its dynamics, culture, values and socio-economic conditions. Additionally, cooperation and trust between CHWs and their community members could be favored by previous relationships of friendship, networks or simply for being recognized as a community peer. As such, residency may favor the ability to understand collective needs, adapt actions and services to the potential and risks of contextual factors and dynamics, communicate more effectively and understand more deeply the personal struggles of their patients.

Within team work, these elements positively contribute to the potential and role of CHWs, if compared with the position of other health professionals or CHWs who reside in a different area. Personal ties and strong identification of CHWs with their community

represent their added value within FHUs and were reported to improve, or viceversa to worsen, the effectiveness of the work of the whole FHTs.

Dialogue, empathy, confidence, mutual knowledge and trust were found to be strategic for assuring access to personal living spaces of patients and, for example, for conducting effective home visits, which is probably the most important activity of CHWs. These dynamics increase the recognition, gratitude and valorization that patients and communities grant to CHWs as persons and as health professionals, which enhances, amongst others, their motivation, responsibility, satisfaction, professional identity and self-esteem. However, pre-existing conflicts or skepticism between individual patients and their CHW, might affect their relationship and thus CHWs' work. For these reasons, residency holds a direct effect on the community itself, which, as it will be better explored later in this chapter, is a strong influencer for CHWs' performance.

CHWs' working conditions and preconditions

CHWs' working conditions and preconditions were widely acknowledged as key influencers for their performance. Factors recognized to have an impact were contractual terms, introductory training, continuous professional development opportunities, and finally support and supervision. The patterns of influence between these inputs and CHWs' performance were strongly homogenous across all studies (Table 8).

Table 8 Summary of findings on CHWs' working conditions and preconditions

Factors	Mediators of effect	L.C.	References
Professional status A. Contract and salary; B. CHWs' representation; C. Professional career plan	CHWs' KAPs A/B/C when precarious or missing negatively impact on CHWs' motivation and ambitions, identity, and commitment with the work.	↑↓	2; 3; 8; 10; 11; 12; 23; 24; 25; 27; 30; 31; 36; 36; 43; 45; 46; 50
Initial training and CPD - Opportunities and continuity; - Timing; - Contents; - Methods.	CHWs' KAPs When not available, timely and relevant, they challenge CHWs' confidence, motivation, professionalism, and commitment. CHWs' knowledge about what and how to observe and advise gets limited, with a negative impact on their potential, appropriateness and completeness of case-management across different situations.	↑↓	2; 3; 5; 8; 10; 12; 13; 18; 20; 21; 22; 24; 25; 27; 28; 31; 32; 34; 42; 43; 45; 46; 47; 50
	Team work When not available and timely, it hampers the potential contribution of CHWs to team work for the prompt and appropriate identification and management of cases.		
Support and supervision - Opportunities and continuity; - Contents; - Methods	CHWs' KAPs When not available and timely they affect CHWs' motivation, professional identity, self-esteem and confidence. Being also directly linked with training and CPD, CHWs' knowledge and practice are not reinforced, nor supervised with consequent increased likelihood for errors and less room for improvements.	↑↓	2; 4; 5; 8; 9; 10; 12; 13; 18; 20; 22; 23; 25; 26; 27; 28; 31; 32; 34; 38; 39; 41; 43; 44; 45; 46; 47; 48; 49; 50
	Team work When not available and timely it leads to weaken the potential and relevance of having multi-professional FHTs working with CHWs.		
	Systemic inputs: community When available and visible to the community, it may increase trust and recognition of CHWs' role.		

Professional status

Studies mentioning contractual terms as modifiers of CHWs' performance were mainly referring to the type of contracts available for hiring, salary levels, the formal representation of CHWs as a working group, and the availability of a professional career plan.

According to the literature review, some type of contracts are felt by CHWs as too precarious, while salaries are considered low, especially when related to the workload. Additionally, CHWs reported that a formal CHWs' association to represent and protect them as a professional category is missing, which contributes together with other factors to weaken their motivation, sense of identity and bond with the health system. Lastly, CHWs complained the lack of a professional career plan and opportunities for professional development and advancement. As reported by some studies, CHWs who are more committed and engaged with the work in their units are also likely to increase their willingness to advance their professional careers within that context. However, the lack of personal financial resources to invest in further education, together with the insufficient salary received and the high cost of professionalization, end up with decreasing ambitions, the degree of engagement with their work, the motivation to improve, while increase their uneasiness with their job and willingness to search for other opportunities.

Initial training and continuous professional development (CPD)

CHWs' attitudes towards the acquisition of new knowledge were generally found to be positive. CHWs understand the powerful and constructive nature of multidisciplinary knowledge for their performance, from problem identification to counseling, at both community and team level. The possibility to enrich their background with biomedical, communication and psychological concepts and tools are seen as a form of social advancement and empowerment for CHWs. Additionally, access to this type of knowledge is felt as a privilege and as a rare opportunity within most of the communities they live in. This awareness increases their self-esteem, their motivation and their sense of responsibility in front of health needs of their patients.

In many studies, however, educational opportunities for CHWs, their continuity, timing, contents and methods, were described as lacking or inappropriate, with negative consequences for their performance. The initial training for newly hired CHWs, which

according to NPHCP should be a precondition for start to work in the field, was often considered inadequate with respect to its timing and content. In some cases, this introductory training was reported as completely missing, while in other instances it was delayed with respect to CHWs employment.

Overall, training contents and methods were considered insufficient for preparing CHWs to field work, to understand and address a wide range of health determinants (biologic, social, economic), to be able to develop appropriate communication skills, to deal effectively with users and to face a variety of contextual challenges. Similar gaps were reported in relation to opportunities for CPD, which were described as irregular, insufficient and fragmented, as well as repetitive and detached from CHWs' needs in daily practice.

A variety of implications for CHWs' performance were reported as a result of inadequate CPD. Gaps were described in CHWs' ability to understand and tackle the causality of events behind health and disease dynamics and to properly account for a broad spectrum of health determinants (i.e.: hygiene, education, sanitation, violence). As a consequence, it was felt that CHWs' ability to identify problems across their community and to work to find solutions, for example by providing health education to patients or referring complications and risks to FHTs, gets undermined. CHWs' perception of health promotion was portrayed by themselves and by team members as narrow and biased by the strict reliance on a 'disease prevention' model, that excludes from patients' counseling and observation a more comprehensive awareness about the needs and opportunities to tackle social determinants. Absence of training may also imply that preexisting beliefs, such as those based on religion and superstition, when not properly confined within personal faith and complemented by technical knowledge, could hamper CHWs' competencies and efficacy, for example by providing to patients explanations of health and disease events on the basis of supernatural laws rather than on biologic, behavioral, social or other contextual determinants.

Deficiencies due to training gaps were also reported in relation to soft skills, including communication, leading to an insufficient ability of CHWs to face highly diversified social, familiar and individual conditions and dynamics, and to avoid judgmental and hierarchical attitudes in front of their patients.

Lastly, training gaps were felt to contribute to inadequate preparedness of CHWs to deal with ethical dilemmas, regarding for example the disclosure of sensible information about community members to third parties (i.e.: related to violence and crime, or to stigmatized infectious diseases), or the need to take the side of health services, doctors and nurses in front of the community.

Support and supervision

Similar dynamics were found in relation to the availability of support and supervision, their continuity, contents and methods. CHWs' supervision and support could take different forms, since it can be internal or external to FHTs and provided by health professionals as well as health managers. Additionally, CHWs' supervision and support were found to be strictly interconnected with CHWs' training and CPD, since they seemed to be often requirements for the availability and development of these opportunities. In this section, the attention on CHWs' supervision and support will be restricted to the ones that should be granted by health professionals internal and external to FHTs, rather than by health authorities. This latter aspect, indeed, will be explored later in this chapter under the paragraph connected with leadership. According to NPHCP and PACS, FHTs' members, with special attention for the nurse, are required to invest and organize part of their time for granting activities aimed at supporting and supervising CHWs. Other health professionals, such as external groups of experts (i.e.: NASF[1]), could be involved by FHTs' members to facilitate and strengthen these tasks.

Similarly to training, any form of support and supervision is highly valued by CHWs and reported to be beneficial for their performance by all other informants. All viewpoints recognized the potential for CHWs of team work, which is seen as the main supporting activity, and the importance of external guidance for managing the challenges of their tasks, the difficulties of their working conditions, including the lack of institutional and external sources of training and information, and the complexity of their social and epidemiological contexts. Team meetings, for example, were found strategic moments for learning and solving problems, as well as for coordinating working activities and developing more complex, collective and integrated actions across their communities, such as health groups and educational activities. Continuous communication, open

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[1] FHTs may rely on additional human resources and external groups of specialist, such as *Nucleo de Apoio as equipes de Saúde da Família* (NASF – support unit to family health teams). The NASF could include social workers, pharmacists, physiotherapists, nutritionists, occupational therapists, amongst others.

exchange and sharing of information between supervisors, especially the nurse, when non-hierarchical and functioning, were found to increase CHWs' motivation, professional status, confidence in clearing out doubts and performing their actions.

Additionally, CHWs described the positive effects of appearing well connected with and supported by a network of health professionals on their self-esteem and their social recognition and trust across the community.

In several accounts, however, CHWs reported that supervision and support received were quite weak, lacking comprehensiveness and continuity, due to the fact that adequate time and space for obtaining guidance on difficult cases and daily problems are not always guaranteed, or, when they are planned, are not always effective and aligned with the principles of NPHCP. The lack of support reflects in CHWs' loss of motivation and confidence in their knowledge and practice, with negative consequences for their professional identity and relationship with users in terms of credibility and respect.

Human resources of family health teams

Human resources attributes regarding other members of FHTs were found to be highly related with CHW program implementation for the direct links between these health professionals and CHWs on an individual base or as a team, and for the indirect influences on CHWs' performance deriving from their essential role in other systemic inputs, such as CHWs' support and supervision or training and CPD. The role of supervising nurses was felt as particularly important to this respect.

Factors that were found to influence CHWs' performance were the availability of FHT staff, their educational background and professional qualification. These inputs all contribute to influence CHWs' performance through the effects on FHTs' members knowledge, attitudes and practice in relation to their mission, which act as important mediators also strongly interlinked with the overall team work. Patterns of influence between this sub-set of human resources and CHWs' performance were coherent across studies (Table 9).

Table 9 Summary of findings on human resources of family health teams

Factors	Mediators of effect	L.C.	References
A. Number and availability of staff (turnover) B. Qualification and background	FHTs' KAPs When A. is limited, FHTs' professionals ability to perform their activities decreases; When B. are not tailored for PHC services, FHTs' professionals attitudes could be inadequate for CHWs (i.e.: hierarchical) and team work (i.e.: undervaluing), relevant knowledge partial (i.e.: soft skills and social determinants), and inadequate for practice. Systemic inputs: human resources When A. is limited, and B. not tailored on PHC mission, training and support for CHWs get partial and inadequate. CHWs' KAPs When A. is limited, and B. not tailored to PHC mission, CHWs' professional identity, confidence and motivation suffer, due to poor or inadequate team work and human resource management. Team work When A are limited, and B not fitted for PHC, team activities might not occur or be undervalued and inappropriate, with negative consequences for CHWs' KAPs. Systemic inputs: community When A. are limited and B. are not fitted for PHC, the availability of FHTs' members to reach the community could decrease and their attitudes with patients could be inappropriate. Community's reactions could be negative and impact on their perception of CHWs.	↑↓	4; 5; 9; 10; 11; 12; 13; 17; 19; 21; 23; 24; 26; 27; 28; 30; 31; 32; 35; 36; 37; 41; 43; 44; 45; 46; 47; 48; 49; 50

Some studies reported deficiencies in the number of health professionals with higher degrees available, if compared to what required by national standards, and their high

turn-over, which was said to be mainly linked with the unwillingness to work in PHC. As a result, the possibilities for these health professionals, and particularly for nurses, to represent a constant support and reference for CHWs, to develop common visions and strategies and plan activities within and outside the FHUs, including quality improvement cycles ("act-reflect-act"), were frequently reported as jeopardized.

Qualifications and educational background of these health professionals, and consequently their knowledge, attitudes and practice, were frequently portrayed as insufficient to ensure adequate support to CHWs and align with CHWs' professional needs. The quality and relevance of supervision and in-service continuous education of CHWs, for example, were reported by some studies as hampered by the views and approaches of nurses and doctors towards CHWs. These health professionals might not understand the importance of providing continuous education and support to CHWs, and, as a consequence, their involvement in these activities is poor. They may also fail to identify CHWs' knowledge and practice gaps, or simply lack the skills to provide adequate learning opportunities. One of the arguments is their general lack of pedagogical competences, which could increase the inadequacy of training and tutoring methods. While CHWs clearly show their preference for active learning methods, where contents are practical and directly applicable to field work, teaching methods used by nurses and doctors were often described as too theoretical and based on normative educational models, where contents are not contextualized or easily translatable into practice, and interactions between trainers and trainees, supervisors and supervised are static.

In addition, contents that are usually included in CPD events organized by FHTs' members for CHWs were found to be too narrow, particularly when considering CHWs mission, which is strongly relational and focused on health promotion and education. Nurses and doctors are often portrayed as strongly oriented and educated to adopt and opt for a disease-centered approach to health. As a consequence, the information and support provided to CHWs tend to be more grounded on biomedical concepts and diagnostic skills, rather than on soft skills, such as communication, which are essential elements for effective health education and promotion practices.

Lastly, CHWs' performance was found to be negatively influenced by interactions within the teams, which may directly shape the relationships between individual health professionals and CHWs, or, indirectly, impact on CHWs' practice as members of a

group. While CHWs would like open and reciprocally enriching relationships, several studies reported how team dynamics are negatively affected by lack of leadership, pronounced individualisms, hierarchical attitudes between health professionals, or simply by lack of full acknowledgement and recognition of the role of CHWs, frequently seen as belonging to a lower social and professional class. Consequently, the collaborative and cooperative nature of team work gets hampered and substituted by a "*EU-quipe*" model (in Portuguese the term *equipe* means 'team', while *eu* means 'myself'), where tasks, strategies and interpretations of the context across FHTs are fragmented, while prioritization, planning and work organization are left to individual choice and communication and relationships are vertical or non existing.

The effects of asymmetries between CHWs and other team members in relation to roles, understanding of needs and priorities for service delivery, continuous education, support and relationships within the team affect their performance through different mediating processes. On one side, they impact directly on CHWs' motivation, confidence, professional identity and self-confidence, while on the other, by acting on health professionals' willingness to support CHWs, they reflect indirectly on the poor, if not missing, organization of activities for CHWs. In addition, they negatively affect team work. When this is suboptimal, so is the integration of skills across team members to promote and deliver more complex activities, such as health promotion and community mobilization. Lastly, some studies reported that when lack and fragmentation of team work is perceived by the community, this reflects in a decreased trust and recognition of CHWs and their work, which undermine CHWs' performance and effectiveness.

3.2.1.2 Leadership and governance

A number of studies described how elements related to leadership and governance of primary health care services and CHW program could impact on CHWs performance. Influences were found to be connected with: the availability of inter-sector policies, programs, guidelines and actions developed and implemented in the area served by CHWs, mechanisms of coordination and support by district health managers to health units and CHWs, and attitudes and communication skills of health managers. Studies included in the review were all coherent in describing negative patterns of influence on CHWs' performance (Table 10).

Table 10 Summary of findings on leadership and governance

Factors	Mediators of effect	L.C.	References
Inter-sector policies, programmes, guidelines and actions for the area served by CHWs	<u>CHWs' KAPs</u> Their lack hampers the potential, reach and effectiveness of CHWs' activities, with negative consequences on CHWs' attitudes (frustration, stress, lack of motivation). <u>Systemic inputs: community</u> Their lack decreases trust and recognition of CHWs and health services across the community, as a consequence of CHWs' failure for problem solving.	↑↓	3; 4; 5; 6; 7; 12; 14; 23; 32; 37; 42; 44; 48; 50
Coordination and support of health managers to health units	<u>CHWs' KAPs</u> When poor, they negatively impact on CHWs' professional identity, motivation and confidence. Indirectly, since they hamper the organization of relevant professional opportunities (i.e.: new trainings, support), and increase CHWs' workload, they negatively impact on CHWs' knowledge and thus on their practical potential. <u>Team work</u> When poor, they weaken team work, since they decrease their potential for planning and organizing actions relevant for the context (i.e.: support for events and situational analysis).	↑↓	3; 6; 7; 10; 12; 16; 19; 22; 24; 27; 28; 32; 34; 36; 48; 49
Knowledge, attitude and skills of health managers	<u>CHWs' KAPs</u> Hierarchical attitudes and inappropriate knowledge and skills for PHC goals decrease the motivation, opportunities and effectiveness of CHWs to engage with managers.	↑↓	2; 7

Inter-sector policies

According to opinions and experiences of CHWs and other health professionals, inadequate leadership was mainly referred to the inability of developing multi-sector

policies and plans, the lack of which hampers the capacity of CHWs to face the contextual challenges of their communities, and which consequently undermines their role in poor and marginalized areas. In several instances, CHWs were highlighting discrepancies between the aim of their mission, as outlined under the NPHCP, and the gaps in the planning and delivery of services. In contexts where issues of basic sanitation, housing, hygiene, poverty and violence are permanent challenges for the health and life of people, CHWs are supposed to provide solutions beyond biological mechanisms. However, their ability to comply with this mission without the support of an efficient health system and multi-sector plans to address major social determinants of health is seriously hampered. As a consequence of these failures, the community in which they serve is less prone to trust, recognize and accept their services.

Knowledge, attitude and skills of health managers and mechanisms of coordination and support

In two studies, managers' profile (mainly FHTs' coordinators and district authorities) was described as inappropriate for the role. Managers were portrayed more as administrative, rather than technical resources, whose actions and decisions are mainly dragged by personal interests and fear their consequences, rather than by the possible effects on service delivery, which compromise their ability to provide adequate, timely and relevant help to CHWs and FHUs.

Evidence from several studies reported complaints by CHWs and other FHTs' staff about the inappropriate support received by managers in terms of defining, developing and supervising strategies and actions to face organizational challenges, including human resources gaps and high workload. Moreover, health managers were often represented as an obstacle, more than a valuable resource, due to their attitude of continuously expanding CHWs tasks and attributions, especially connected with bureaucracy and data collection. Lastly, models of communication between managers and CHWs were also found to be centralized, autocratic and led by hierarchical attitudes.

This institutional environment was found to jeopardize CHWs performance and productivity at many levels. The scarce pro-activity of managers in promoting inter-sector activities to support CHWs' mission decreases their motivation and effectiveness. When viewpoints, successes and needs of CHWs are poorly recognized and even listened to, then CHWs' attitude in relation to their work and its possible improvement

becomes passive. In such cases, their morale decreases, together with their willingness to take advantage of the little support that might be received, with a consequent loss of ownership on their tasks, missions and attributions.

3.2.1.3 Service delivery modes

Across the studies analyzed, two aspects related with the organization of service delivery within the CHWs program were considered to impact negatively on CHWs performance. These were the number of families assigned to each CHW and the tasks attributed to them and to other FHTs' staff members. Studies reported only negative impacts of both aspects, and findings were homogenous across all studies, although the evidence on CHWs was much more robust (Table 11).

Table 11 Summary of findings on service delivery modes

Factors	Mediators of effect	L.C.	References
CHWs - Volume of patients; - Task attribution	CHWs' KAPs Their excessive amount negatively impact on CHWs' attitudes (stress, frustration, motivation, professional identity) and practice (relevance and quality of tasks). Systemic inputs: community Their excessive amount negatively impact s on the time dedicated to attend community members and the type of activities performed. CHWs' gaps and failures contribute to decrease community's trust and recognition.	↑↓	2; 3; 5; 6; 8; 10; 12; 13; 15; 16; 17; 20; 22; 24; 25; 28; 30; 32; 34; 35; 42; 43; 44; 45; 47; 50
FHTs - Volume of patients; - Task attribution	Team work Their excessive amount negatively impact on the potential and availability for team work, including CHWs' support, supervision and training.	↑↓	10; 12; 19; 23; 24; 26; 41; 42; 45; 47; 49

CHWs and other FHTs' health workers reported to bear responsibility for an excessive volume of families and to be assigned by health managers with an excessive amount of tasks, including overwhelming administrative duties. CHWs and other informants complained about the continuous expansion over time of CHWs' attributions, especially bureaucratic, which are often unclear, poorly explained and well beyond the scope of

CHW program. CHWs, in particular, feel abused in their role by vertical imposition of an increasing amount of attributions, and get frustrated and confused by what they perceive as a misunderstanding of their role and mission. As an example, according to CHWs experiences, due to their overload, the number and frequency of home visits that could be secured for each family are much less than what is formally established by national guidelines. Similarly, the time assigned for listening to patients at the FHU reception was progressively reduced and became less personalized. Educational activities, health groups and all other events that foster the active participation of patients and social groups are becoming increasingly harder to organize, due to lack of time.

Doctors and nurses, on their side, find difficult to comply to their supportive role for CHWs and argue that the time for team work, including prioritization, planning and development of common activities is insufficient.

These deficiencies, together with the blurred boundaries that define CHWs' role, were reported to impact negatively on their motivation, self-efficacy and ability to organize and deliver service appropriately. Additionally, these gaps were found to decrease trust and recognition of CHWs across their communities, and to hamper the realization of activities that could empower social groups, increase social cohesion and bonds across community members.

3.2.1.4. Other health system factors

CHWs' performance was found to be influenced not only by health system elements that are strictly related to CHW program, but also by two aspects connected with the organization of the overall health care: the existence of patients with private health plans and the lack of prompt responsiveness of the health system to patients needs for consultations or laboratory exams. Both factors were reported uniformly across studies to jeopardize CHWs' work, although most of the evidence was focused on the former aspect (Table 12).

Table 12 Summary of findings on other health system factors

Factors	Mediators of effect	L.C.	References
A. Responsiveness of health system B. Private health plans	<u>CHWs' KAPs</u> The lack of A. and the existence of B. act negatively on CHWs' professional identity, stress, motivation and frustration, mainly as a consequence of community's experiences of care.	↑↓	4; 5; 8; 12; 20; 23; 24; 34; 35; 36; 37; 40; 42; 45; 48
	<u>Systemic inputs: community</u> The lack of A. and the existence of B. (for those who can pay) increase community's mistrust and denial of CHWs and their services.		

The existence of private health plans could lead community members to bypass or reject CHWs services, with negative consequences for CHWs morale and professional identity.

Gaps related to the overall functioning of the health system included difficulties in accessing and scheduling consultations in other facilities or with health specialists, poor follow up, long waiting time for receiving results of diagnostic tests, vertical relationships between health professionals and patients, poor feedback. As a result, community members' trust in the health system and their willingness to access its services, including CHWs, gets reduced. The relationship between CHWs and their patients were found to be particularly affected by this negative loop, as CHWs are the most proximal representatives and connecting points between the community and the health system.

As reported by all CHWs, when the community loses confidence in the health system due to negative occurrences, the overall credibility of CHWs gets lost with consequential difficulties for the communication with families and the delivery of services. This situation translates in frustration, sense of powerlessness and guilt in front of their patients, which is further exacerbated by their strong sense of responsibility for the health of community members with whom they frequently have personal ties. Additionally, it increases their stress and workload, for example for trying to overcome resistances and mistrust.

3.2.1.5 Infrastructure and equipment

Few studies described how CHWs' performance could be affected by their working space and by availability of equipment (Table 13).

Table 13 Summary of findings on infrastructure and equipment

Factors	Mediators of effect	L.C.	References
- Availability and quality of material; - Availability and quality of space	CHWs' KAPs Their lack decreases the potential of CHWs to conduct their activities, which impact negatively on their frustration, their mission and professional identity.	↑↓	6; 12; 13; 15; 17; 24; 27; 34; 35; 37; 47; 48
	Team work Their lack decreases the likelihood of organizing team meetings and discussions		
	Systemic inputs: community Their poor quality decrease the privacy of patients and of their experience of care, with negative reactions on CHWs		

Studies consistently reported complains for poor availability and quality of the infrastructure and materials. For example, in a few studies, CHWs explained that health units are not always provided with enough space for conducting health promotion activities with large groups, which hamper their professional potential and decrease their motivation to set up this type of events. When spaces are physically available, they might be used for other purposes. For similar reasons, difficulties were reported in holding meetings amongst all health professionals within FHTs, which might decrease the likelihood to organize team meetings and discussions. In addition, complaints were reported in relation to frequent lack of sufficient space to assure patients' privacy, with negative consequences on patients' perception of health services and their health professionals. Commodities, including vaccines, are occasionally lacking.

3.2.1.6 Information system

All health units are requested to systematically feed the central information systems, such as the PHCIS, with epidemiological and social data pertaining to the communities

they serve. Data collection is mainly falling under the responsibility of CHWs, as outlined by CHW program. Within the NPHCP, information systems are conceived as strategic tools for team work and discussions, since they should be used for interpreting the context and plan efficiently team activities. Consequently, CHWs should benefit from the data collected for planning and prioritizing their work accordingly to an informed situational analysis.

However, our review revealed how the potential benefits of information system are jeopardized by the type of data collection tools and methods, and by the use made of information. These findings were supported by a satisfactory number of references and were coherent in the pattern of influence that were described (Table 14).

Table 14 Summary of findings on information system

Factors	Mediators of effect	L.C.	References
A. Understanding of IS tools, methods, uses and objectives; B. Appropriateness of IS tools, methods, uses and objectives for the context; C. Ownership of IS tools, uses, objectives and mechanisms by FHTs	CHWs' KAPs Poor A. B. and C. impact negatively on CHWs' motivation to use the IS, and on their ability to use it properly. These gaps negatively decrease IS potential to support with knowledge of patients and collective health profiles, and thus to adapt CHWs' practice.	↑↓	9; 13; 16; 18; 20; 34; 42; 44
	Team work Poor A. B. C. tend to decrease the overall motivation of teams to take care and advantage of the potential of the IS for team organization, planning and prioritization.		
	Systemic inputs: leadership and coordination Poor A. B. C. tend to produce unreliable information that are poorly informative for situational analysis of the communities, and so poorly useful for leaders, managers and policymakers.		

Three main aspects were found connected with the failure of the information system to assist CHWs' performance: the understanding by CHWs of its tools, methods, uses and

objectives, their appropriateness to the context and consequently their ownership by the FHTs.

The use of information systems was often described to be poor, incomplete and fragmented. Major deficiencies were reported at the level of data collection methods and data analysis.

Some studies reported CHWs' complaints about the lack of relevance and adaptability of data collection tools for their field activities. The tools adopted are perceived as too complex, with difficult terminology and a confusing display of information. Moreover, according to CHWs, they neglect information that is essential for their practice and for a comprehensive record of their patients' profile and history. For example, there is not sufficient space for reporting some heath and social conditions, nor for coupling standardized data with personal notes. On the contrary, some of the information requested is too personal and unrelated to health, which creates uneasiness in both patients and CHWs during data collection. Through the information system, CHWs found difficulties in achieving a comprehensive and practical view of their patients' records, which is believed crucial for an holistic approach to health and effective follow up, as well as for their own work planning. As a consequence, CHWs often use personal notebooks, while they lack of motivation to adopt PHCIS in practice.

The perception and understanding that data collection could be a valuable instrument for the internal analysis and planning of teams and CHWs' work is not always shared across team members. The information system, its requirements and its products, such as reports and indicators, are often felt by health professionals more as a task imposed by health managers, rather than something which would provide guidance for their work. The ownership of the objectives pursued by the information system, and a full comprehension of their potential usefulness, are further undermined by the fact that CHWs and team members are not adequately trained to interpret its outputs, and by the lack of external support and facilitation for data analysis.

These factors and dynamics decrease the overall reliability of the data collected through the formal information system, their completeness and standardization and their subsequent interpretation by FHTs, as well as by health authorities in the attempt to conduct an evidence based situational analysis. On the other side, the subjectivity of the data collected by CHWs with their own tools, biases the use of this information and

negatively impact on their reliability. As reported in some studies, these gaps impact on the motivation of CHWs and other team members, as they feel constrained to perform a useless activity. Additionally, they increase CHWs' workload, as individual data collection requires time for being translated into standardized and official forms. Lastly, health authorities and team efforts for prioritize and plan their activities, including the ones undertaken by CHWs, accordingly to information collected may be undermined.

3.2.1.7 Financing

The financing mechanism adopted under the NPHCP for releasing incentives to health units is based on a monitoring scheme of team activities set on quantitative targets and indicators. Although financial incentives have been introduced to increase the productivity of health workers, the few studies included in this review that mention them were consistently showing how specific features of this mechanism were producing distortions and obstacles for CHWs' performance.

Information from these studies describes how the lack of understanding of the incentive system and its objectives, as well as the lack of appropriateness and ownership of targets and indicators by family health teams negatively impact on CHWs performance (Table 15).

Table 15 Summary of findings on financing

Factors	Mediators of effect	L.C.	References
A. Understanding of incentive system and objectives; B. Appropriateness of targets and indicators to the context; C. Ownership of targets, indicators and objectives by FHTs.	CHWs' KAPs Poor A, B and C may divert CHWs' practices from their mission, increase the quantitative products, but not their quality, and negatively affect their professional identity.	↑↓	6; 8; 13; 16; 20; 34

According to what reported by CHWs and health professionals, the selection of performance indicators was made without prior consultation and discussion with CHWs and FHTs' members about what would be feasible and appropriate to be measured. This first element is perceived by all professionals as a vertical imposition of the authorities. Among the consequences of this imposition, those most frequently cited were

describing a mismatch between the targets set by the financial incentive mechanism and those which would make sense to FHTs for measuring their performance. First, indicators were said to be focused on disease specific aspects of health, rather than providing a more comprehensive view of health related practices, including educational and promotional ones, and their determinants. Second, monitoring indicators were found to be exclusively based on quantitative dimensions of CHWs' activities.

These features, according to CHWs and other health professionals experiences, were reported to impact negatively on CHWs' performance for different reasons. The pressure to reach monthly targets was found to foster competition amongst CHWs, and push them to 'produce for money', rather than 'produce for health'. Additionally, the quantitative nature of the goals was said to alter CHWs practice and overall mission, and deviate them towards quantitative goals, generally more disease-oriented practices, rather than quality services, which are more adapted for capturing promotional activities. CHWs declared to privilege the implementation of faster and easiest tasks, which allows them to reach their targets, rather than actions that require longer time and efforts, such as educational groups, who are not properly accounted for and rewarded in their monthly balance. This distortion feeds the detachment of CHWs from an holistic view of health and a humanized model of service delivery, formally envisaged under the NPHCP, and shifts CHWs' engagement towards those activities that are most suited to reach their monthly goals.

3.2.2 Inputs from the community system

Community context, profile and dynamics, including socio-economic conditions, cultural background, values, attitudes and power relationships, were found to impact not only on the health outcomes to which CHWs are supposed to contribute, but on the of CHWs' performance. While it is obvious that social determinants impact directly and indirectly on health outcomes, it may be not so widely recognized that they may have a direct influence on the way that health professionals and services working in those communities perform. Interactions between CHWs and community members are not unidirectional, but are highly complex and with patterns of influence that continuously feed a loop of mutual recognition, trust and motivation. As described in the previous paragraphs of this chapter, these relationships were also found to reflect positively or

negatively, depending on the experience, the consequences generated by formal health system inputs, for example a poor responsiveness of the health system badly mirrors on the trust in CHWs. The interaction between CHWs and patients was reported as depending on individual and collective knowledge, attitudes and expectations of community members in relation to health and health services, on their socio-economic conditions, as well as on their social networks and attitudes to collective problem solving within the community.

These factors and mechanisms were widely covered in the studies included in the review and all findings were coherent in interpreting their pattern of influence on CHWs' performance.

3.2.2.1 Individual and collective knowledge, attitudes and expectations in relation to health and health services

The overall individual and collective understanding of the scope and limits of public health system, their knowledge and attitudes in relation to health services, service delivery modes and health professionals, including CHWs, as well as their understanding and views about health and disease, were widely acknowledged amongst factors that could facilitate or hamper CHWs' performance (Table 16).

Table 16 Summary of findings on individual and collective knowledge, attitudes and expectations in relation to health and health services

Factors	Mediators of effect	L.C.	References
A. Understanding of scope and limits of public health system: * health services ; * models of care; * health professional roles * CHWs' tasks. B. views about health and disease C. Social recognition of and trust in CHWs	CHWs' KAPs A poor comprehension of A. and B. might impact negatively on the interactions with the community and so the potential of CHWs' practice and knowledge on certain dimensions, which all have consequences on CHWs' stress, frustration, professional satisfaction and identity. Otherwise, a better or less resistant understanding can inversely benefits this cycle and CHWs motivation. C. is a consequence of the interplay of various factors already mentioned. Similarly to A. and B.,	↑↓	2; 3; 5; 6; 8; 10; 12; 13; 14; 17; 19; 21; 23; 25; 27; 28; 29; 30; 31; 33; 34; 35; 36; 37; 38; 39; 40; 42; 43; 44; 45; 45; 46; 47; 48; 50

	when weak, it negatively affects CHWs' KAPs, but when strong it boosts primarily CHWs' positive attitudes.		

Understanding of scope and limits of public health system

The opinion of CHWs and other health professionals emphasized very often the lack. By community members, of a thorough understanding of the goals of health services, models of care, and existing constraints in service delivery, with negative consequences for their views about CHWs and their work.

According to CHWs and other health professionals, the majority of their patients hold a narrow and distorted view of health care and health services, which is based on a biomedical, disease-and-treatment centered approach to health. As a consequence, for example, health units and health professionals are hardly perceived and accepted for purposes that go beyond disease treatment. CHWs' performance, and especially their ability to organize and carry out activities focused on health promotion, counseling and education (such as health groups), get severely hampered as they get often refused, ignored or discredited as perceived far from the health and disease needs of the population. Health professionals and CHWs' attribute to a poor understanding of determinants of disease, resistances of community members to change personal behaviors and lifestyles at individual and collective level. For them, these perceptions contribute to decrease their social recognition, and impacts directly on CHWs' frustration. This overall attitude impacts directly on CHWs. Mainly biomedical views about health and disease may undervalue actions promoted by CHWs, seen as belonging to a lower category of health professionals when compared to what is offered by other health professionals, such as doctors and nurses.

The distance between community members and primary health care professionals, including CHWs, could be attributed, according to our review, to other characteristics and dynamics that are depending on the organizational deficiencies of health services. The poor responsiveness of the overall health network and its professionals, particularly health specialists and providers at secondary and third level facilities, boosts community skepticism for primary health care professionals, who are viewed as responsible for what is perceived as a failure of the system, such as delays in getting a consultancy, a drug or a laboratory test.

At the level of direct interactions between community members and CHWs, contrasts and frustrations of community expectations were found to be linked with the perception of some patients to be neglected by their CHWs, or the attitude to think that CHWs are lacking of problem solving skills, that should be otherwise faced by referencing to other FHTs' health professionals or higher levels of the health service network. In addition, the inability of CHWs, to schedule their activities as expected or preferred by their patients is poorly accepted. This is the case, for example, of complaints in relation to home visits, where the CHWs' availability, generally set for morning shifts, is not matching with community members preferences for the afternoon ones.

Accordingly to the reports of health professionals and CHWs, the objectives, professional role and contextual limitations of CHWs' work are poorly understood and easily misinterpreted by community members with consequences that range from lack of respect, trust and recognition for CHWs, to an excess of expectations about their problem solving capabilities.

Views about health and disease

Especially according to health professionals, the social and educational background of community members belonging to the areas where CHWs operate could affect profoundly their views of health and disease, their perception of their own needs and therefore their acceptance and reactions of CHWs' services and orientations. Strong cultural beliefs and stereotypes together with a low educational level were consistently reported across the studies as factors that could increase community members' resistance to CHWs' counseling, and to health-related behavior change.

Social recognition of and trust in CHWs

Social recognition of CHWs' role and services across their communities deserves particular attention, since it is enhanced, or viceversa undermined, by almost all factors previously described and it is acknowledged by all studies as a powerful non financial form of incentive or disincentive for CHWs.

Social recognition of CHWs as health professionals was described as a requisite for establishing or strengthening ties between CHWs and their communities. The creation of strong bonds was found to facilitate an open dialogue between CHWs and their patients, as well as a way for get more proximal to intimate life contexts. These aspects are considered crucial for an appropriate and comprehensive delivery of CHW services, including risk identification, counseling and community empowerment. Social recognition was found to be strictly connected with the possibility for CHWs to expand the reach of their services beyond health units, and start a dialogue on health and its determinants within the daily spaces and routines of community members, such as churches, markets or schools. Social recognition, trust and credibility were reported to be particularly important when interacting with hard-to-reach population group, such as gangs and drug dealers.

When population feedback is positive, CHWs described it as a powerful non financial reward for their work and personal development. Indeed, it was reported to positively increase their motivation, gratification and satisfaction, which supports a more favorable perception of their workload and tasks. Under these conditions being a CHWs evolves into a positive life experience, a mission and an important opportunity to learn and help others, rather than being viewed as a mere duty.

On the contrary, when social recognition of CHWs is undermined, trust in CHWs is lost and thus their services are not sought or accepted. All these factors and dynamics were said to negatively impact CHWs' performance in various ways. For example by jeopardizing contacts and communications between CHWs and patients, or exacerbating shame, or fear of privacy breaches and inappropriate use of personal information, especially in hard-to-reach population groups. At the same time, lack of social recognition and respect for CHWs' role was reported as a reason for community members attempts to obtaining personal favors by CHWs.

3.2.2.2 Social networks and attitudes to problem solving

Social cohesion, family ties and their organization define the existence of social and safety networks of persons and entities across the community and within families, and shape individual and collective attitudes to problem solving and mutual support. These aspects are defined by many factors. Personal attitudes, such as individualism, empathy or interdependence, influence interactions with other individuals (i.e.: neighbors, friends, family members or strangers) and shape community representatives and groups (politicians, leaders, religious or sport associations, activists). These interactions can be perceived as safety nets, or generate insecurity and conflicts. Similarly, precarious socio-economic conditions and living standards (such as violence, low educational levels, lack of job opportunities, abuse of drugs and alcohol), geographical obstacles, the interplay across different cultural values and stereotypes (including gender roles, views on homosexuality and prostitution), the organization of space (i.e.: for leisure or sport) can foster cohesion or generate distances.

A high number of studies included in this review mentioned the impact of social cohesion and family ties on CHWs' performance, and results were consistent in describing their mechanisms of influence (Table 17).

Table 17 Summary of findings on social networks and attitudes to problem solving

Factors	Mediators of effect	L.C.	References
- Social cohesion; - Family ties and organization.	CHWs' KAPs When social cohesion is weak, the potential of CHWs' practice and access to information get limited, especially with hard to reach and isolated groups. This all negatively reflects on CHWs' frustration, professional recognition and stress. Conversely, when it is strong, CHWs' motivation and satisfaction get benefitted, and access to knowledge and practice are facilitated and supported.	↑↓	1; 3; 5; 6; 8; 10; 14; 17; 20; 21; 23; 24; 25; 28; 29; 31; 32; 33; 34; 35; 36; 39; 48

Overall, CHWs' performance was found to be influenced negatively by weak social cohesion and family ties, and positively by strong bonds between individuals and across the community. The impact of these factors on CHWs' performance is mediated by their

effects on CHWs' attitudes and practice, as well as by individual and collective knowledge, attitudes and expectations in relation to health and health services.

When personal and collective ties are weak, then community responsiveness, engagement and interest for CHWs activities is poor and discontinuous. CHWs find harder to identify key partners, networks and organizations to support them in their practice. Therefore, their ability and motivation to develop, implement and promote actions, including health education get seriously hampered, also due to the perception of recipients that these services are imposed. If confidence and cooperation are weak, cultural resistances and material barriers at individual and community level are harder to be overcome, as in the case of isolated patients and hard-to-reach populations. In addition, when personal interests are too strong, they get in conflict with the need to act for collective goods, such as addressing a wide range of health determinants, and impede building awareness that health should be reached not only individually, but through community efforts and investments.

On the contrary, when CHWs deliver their services within a community context characterized by social cohesion and strong family bonds, their actions are facilitated since the planning, organization and development of their activities are supported by the active engagement and participation of individuals and groups across the community. The responsibility of CHWs for individual and collective health is understood and shared, and CHWs' actions are supported and sustained through mutual solidarity. In such contexts, the achievement of positive outcomes was found easier and increased community members' personal and collective motivation to protect and promote their health and health services, and CHWs' motivation to perform their work.

3.2.2.3 Socio-economic conditions

Community settings where health units are placed and CHWs work are often characterized by difficult socio-economic and environmental conditions which were mentioned across the studies as factors hampering CHWs performance (Table 18).

Table 18 Summary of findings on socio-economic conditions

Factors	Mediators of effect	L.C.	References
- Socio-economic resources; - Environmental hazards, hygiene, sanitation, housing, education (…).	CHWs' KAPs When conditions are weak, they badly impact on CHWs' problem-solving potential and effectiveness, might decrease the adequacy of CHWs' knowledge and contribute to negatively impact on CHWs' morale, frustration and satisfaction.	↑↓	3; 5; 6; 12; 14; 17; 20; 23; 24; 29; 35; 39; 40; 42; 43; 45; 46; 48

FHUs are placed in areas characterized by different type of challenges and threats for CHWs' performance, especially their ability to access their patients, to properly interpret and get understood in relation to their needs and problems. Areas heavily hit by violence, due for example to conflicts between community groups engaged in illegal activities, or to environmental hazards, such as the presence of dangerous animals, parasites, electrical fences, flooding, etc., represent physical and moral obstacles to CHWs' practice, as they might refrain or impede CHWs to reach some of their patients, as well as impede access by community members to health services.

Lack of financial resources, widespread socio-economic difficulties and harsh conditions of families that go well beyond health, negatively impact on their ability to invest in their health, and improve their health related behaviors according to CHWs' advice, provided that their suggestions can be adopted and be effective in these contexts.

These factors generates frustration when they are overwhelming and impact negatively on CHWs' motivation and professional satisfaction, as well as on the individual and collective perception of the usefulness of services provided by them and ultimately on social cohesion and attitude to problem solving of the communities.

3.3 Logic thematic model

Figure 6 represents the resulting logic thematic model of this review. The upper (health system inputs, mediators, CHWs' performance and health impact) and lower (health system and community system) boxes describe the captions to the framework, which summarizes the links between the health and community system inputs, CHWs'

performance, health impact at population level. The framework, in accordance with the findings of our review, identifies CHWs' KAP, other FHTs health professionals' KAP and team work as key mediators of the effect of health system inputs on CHWs' performance and at the same time recognizes that this performance is also affected by the community system, including issues related to access to services and health beliefs and behaviors. For the sake of clarity, only main categories generated by the review are displayed in the model, which implies the function of all categories at a lower hierarchical level.

CHWs' performance, the core analytical focus of this review, is placed in the third column, between health and community systems' inputs (first column and second to last row), mediators of effects (second column) and health outcomes at population level, including access and use of services and health behaviors and practices (fourth column). Arrows represent the logic connections found through the analysis of the literature between all elements of the framework. They can be unidirectional, or bidirectional.

As described in the narrative synthesis, CHWs' performance is influenced either directly or indirectly by systemic issues, mediators of effects, but also by the effects they have on health outcomes within their population (changes in access to services or behaviors), which feedback on their performance and on elements included in the community system.

Figure 6 Logic thematic model for CHW program implementation and CHWs' performance in Brazil
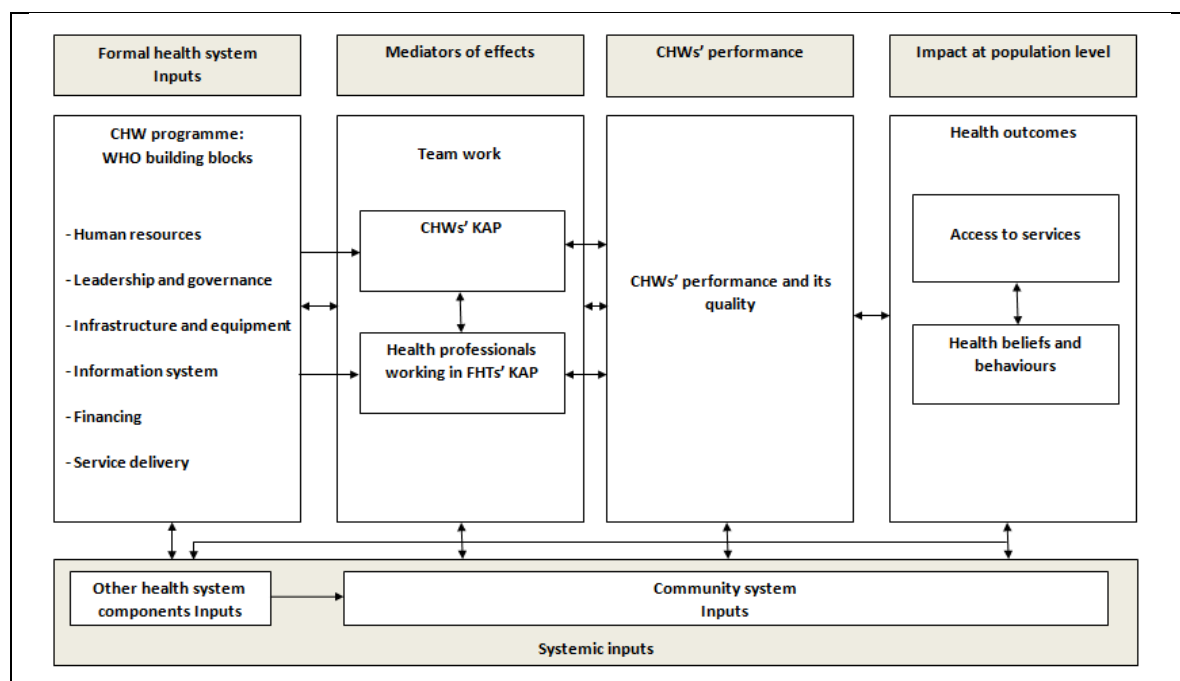
4. Discussion

Our qualitative literature review of studies carried out in Brazil showed that CHWs' performance is influenced, through complex and non-linear connections, by a wide range of systemic inputs, and mainly by CHW specific and non-specific components of the health system and the community system.

Among the variety of factors involved and their complex interactions, two factors emerged from the review as key for the quality of CHWs' performance: the policies regarding the human resources and their management on one side and the community views towards health on the other.

Within the former, the evidence reported highlighted the key role played by the lack , or inadequacy, of training, CPD, support and supervision provided to CHWs, all of which were reported as profoundly affecting attitudes, knowledge and practice of CHWs. The role played by health professionals working in team with CHWs, their leadership, attitude and supervisory skills were also identified as playing an important role in shaping the ultimate functioning of CHW programme.

Within the latter, two elements were found to be highly influential for CHWs' attitudes, knowledge and practice, and therefore for their performance: the communities'

individual and collective knowledge, attitudes and expectations in relation to health and health services, including CHWs' role and tasks, and the existing level of social cohesion and attitude to collective problem solving.

Our review confirm the main findings of extensive reviews and studies addressing barriers and facilitators of CHWs' performance (Glenton et al., 2013; Naimoli et al., 2014; Kok et al. 2014; Kok et al. 2015; Schneider et al., 2016) in recognizing that the formal health system, through its various components, and the community system, through its economic social and cultural features, should be seen as the two main system players in shaping the performance of CHWs as well as the effectiveness of CHW programs. Mechanisms of reciprocal influence between factors seems also similar to those described by Kok et al. (2014, 2015) and Glenton et al. (2013). Also, similarly to what shown by Kok et al. (2014; 2015), Naimoli et al. (2014) and Glenton et al. (2013), CHWs' KAP seem to be the key mediators between the inputs from the various components of the two systems and CHWs' performance.

Our findings are aligned with the reviews by Kok (2014, 2015) and Glenton et al. (2013) in identifying the appropriate management of human resource aspect as crucial to facilitate CHWs' performance. This includes interactive training methods and action-oriented contents, with priority given to communication skills, and guidance for support and supervision to be provided to CHWs, including recognition of their role and collaborative team work (Glenton et al., 2013).

While our findings confirm the role attributed to the various factors in influencing CHWs' performance, they somewhat differ in assessing the direction of this influence and the main mechanisms through which this influence is exerted.

For example, from the review by Kok et al. (2014) financial incentives emerge as factors which can increase motivation and adherence to standards and at the same time can shift the performance based on the type of incentives. In the review by Glenton et al. (2013), salary is portrayed as an aspiration for volunteers and as a source of frustration for those CHWs who are entitled to it but feel it is too low. The concern that its introduction would shape differently CHWs' role and its relationships with both the health system and the community is also mentioned. While we confirmed the contradictory role of financial incentives, their role emerged mainly as negative. This is not surprising in a system where CHWs are fully integrated in the health system. In such

a system, where the salary is given for granted, although a source of complaint because too low, financial incentives which are based on quantitative outputs, are unanimously seen as a cause of distortion of CHWs' role, professional identity, and a cause of daily conflict between the quality content of the activities and their number. Clearly, financial benefits where CHWs are not integrated into the formal health system and therefore are not paid or receive extremely low salaries may be seen much more favorably. Brazilian CHWs are able to conceive in principle the potential value of incentives, particularly the non financial ones, such as opportunities for professional development and career progression, but complain that financial incentive mechanisms are not focusing on what CHWs perceive as their core tasks. The different, on average higher, educational level of CHWs in Brazil and the motivation that the older CHWs still maintain as servants to their communities may be explanations of these differences.

Similarly, the role, and therefore the lack, of leadership and governance capacity of managers and coordinators and of user-friendly and relevant information system were found more important in the Brazilian system where CHWs are integral part of the formal health sector and therefore suffer from the inadequacy of what they perceive as essential system elements. Expanded tasks and longer time spent for service delivery were found by Kok et al. (2014) as positive factors for CHWs performance, while in our review the extension of task attribution was usually negatively perceived. This might be due to the fact that Kok et al. (2014) included many studies where CHWs programs were not integrated with the health system, thus feeling part of a health program was felt as a professional reward, and expanding tasks as a way to get a higher salary, while in our review are mainly seen as a burden.

Our findings also confirm the important role of social recognition of CHWs' role by the community, of the views about health and health services of community members and of their relations with health professionals in shaping CHWs' motivation and consequently their performance emerging from both reviews. We have also confirmed the contradictory role played by requiring CHWs to be resident in the community they work for described by Glenton et al. (2013). The mix of trust, expectations, personal ties, ability to read the context, responsibility, blame that being a resident brings about may lead to a variety of possible favorable and unfavorable influences on CHWs' performances.

Finally, the degree of community participation and cohesion, the prevailing cultural beliefs and the presence of social and economic hardships have been recognized by our review as strong influencers of CHWs' performance, in alignment with Kok's and Glenton's reviews (Glenton et al., 2013; Kok et al. 2014; Kok et al. 2015). This is a particularly interesting finding. While it is widely recognized that social determinants impact directly and indirectly on health outcomes (WHO, 2008), it is not so widely acknowledged that they may have a direct influence of the way that health professionals and services working in those communities perform. Interactions between CHWs and community members emerge as largely bidirectional.

4.1 Strengths and limitations

To our knowledge, despite the large amount of qualitative studies involving CHWs in Brazil, this is the first systematic review that attempts to synthesize the available evidence. Additionally, it is the first attempt to describe Brazilian CHWs' performance within a system approach, based on a dynamic model and logic connections among reciprocally influencing systems.

Its theoretical background was based on international findings and reviews on CHWs' performance and on time-honored international consensus on the categorization of health system components. We have conceived our work as an attempt to translate the rich and unique Brazilian experience of CHW program into a conceptual model that may be widely accepted internationally, so that comparisons can be made easier between the Brazilian program and other similar programs. More specifically, the development of a comprehensive and detailed code book, comprehensive of health and community system factors and logical connections, grounded on international literature but adapted to a national program (instead of cross-national comparisons), could be used as a constructive resource for similar studies applied to other national CHW programs integrated within the formal health sector.

A strength of our review was that the search was not restricted by any language requirements, which allowed articles published in Portuguese and Spanish to be included. In this way, it was possible to overcome the limitations of the international reviews (Glenton, 2013; Kok, 2014, 2015) and include evidence from Brazil. Qualitative literature addressing Brazil's CHW programme is vast, and although the quality of individual studies is generally medium to low, we believe that the strong coherence of

the evidence reported across studies allows to be moderately confident with the findings of the review. The degree of confidence on the evidence retrieved within this study, which was assessed through the CERQual approach, can be used to overcome scepticism of policymakers on qualitative studies and advocate the use of findings for better informed and evidence-based decision-making on CHWs' programs and implementation strategies.

The strongest limitation was represented by the availability of only one researcher for data collection, selection, assessment and analysis which may generated bias and errors. The likelihood of missing some relevant reference should be minimized by the review methods. Differently from systematic reviews, whose aim is to assess the effectiveness of interventions, the purpose of qualitative synthesis is more descriptive and analytical than strictly predictive. Factors and causal interconnections are presented as informed, but tentative, explanatory hypotheses of CHWs' performance based on adequacy and plausibly criteria, rather than probabilistic and deterministic inferences (Habicht, Victora & Vaughan, 1999). Having the achievement of a conceptual synthesis as the objective of our review allows for more flexible procedures in the study selection process, if compared to effectiveness-focused reviews. Differently from quantitative systematic reviews and meta-analysis, which seek to quantify the probability of an inference, in these type of reviews, results are not altered by the inclusion or exclusion of a certain amount of studies. In this case, bias is determined by the saturation of themes, concepts and dynamics used to develop a comprehensive explanatory theory and logic model (Thomas et. al, 2008).

In addition, we recognize that our review did not included studies before 2002, when CHW program was already established in the whole country, although without a recognition as a formal professional cadre.

Regional variations in CHWs' performance and CHW program implementation were not captured within the review. We acknowledge as a potential explanation the inclusion of only a minority of studies from the Northern Regions of Brazil, which hinders the possibility to analyze heterogeneity across settings.

Moreover, the majority of findings were based on the views of CHWs and almost half of the studies reported considerations made by other FHTs' health professionals, while the community perspective was poorly represented. This limitation narrows the results of

the review towards an health system perspective, which exclude the direct views, experiences and considerations of one of the major stakeholders involved in CHW programs. Poor variation across data collection methods adopted in the included studies further emphasized this gap. The infrequent use of ethnographic observation, or triangulating strategies, to explore CHWs, their work, context and interactions, limit the inclusion of external points of view and focus the results on the direct opinions of a narrow range of experiences.

Further qualitative research should aim at capturing better the community perspective, combine different methods for data collection, including ethnographic research, and attempt to explore regional variations across the country.

4.2 Conclusion

In conclusion, the general model and the code book used to analyze CHW performance within a national program are supported by our findings, which seem aligned with international literature. Within the general recognition that the model itself is coherent and works as an analytical and explanatory tool, it is important to highlight that patterns and direction of influence of a variety of system factors are highly context-dependent. This should lead to emphasize the importance of locally grounded analyses. Future operational research should be oriented to adapting the model to other CHW programs and to contextual analyses that may guide to the identification of appropriate policies to address the issues emerging as critical for program success.

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Chapter II – Case-study: Case-study: Process evaluation of an intervention trial to improve CHWs' performance

1. Background and objectives

In this chapter, the analysis will turn around a case-study, namely a community-based trial to improve the effectiveness of home visits (HVs) carried out by CHWs to pregnant women and mothers. The implementation and impact of the trial will be explored through a process evaluation, from an health system perspective, using qualitative methods with the attempt to capture mechanisms and influences of system-level and contextual factors on the results achieved, according to the experiences and views of participants. Results will be discussed mainly through comparisons between the assumptions implicit in the intervention and the logic model developed in Chapter I for displaying the dynamics influencing CHWs' performance. The intent of this comparison is to get valuable insights for future improvement – for the trial under discussion, and beyond - and assess the potential of the logic model as an heuristic tool for quality improvement interventions for CHWs' performance in Brazil.

The case-study is focused on a randomized controlled, before-after study, aimed at improving CHWs' performance in HVs to pregnant women and mothers in 18 FHTs employed in three health Districts in the city of Recife, in the Northern East of Brazil.

Accordingly to the NPHCP, it is responsibility of CHWs, among others, to follow, through HVs, all families and individuals (MdS, 2011). HVs are considered one of the most important tasks of CHWs and their effective implementation is key to achieve improvements for maternal, neonatal and child health and development (Tripathi et al., 2016; Rotheram-Borus et al., 2014). Current recommendations, however, fail to provide satisfactory guidance on how to conduct them (Drulla et al., 2009; Gaiva et al., 2011). These gaps set the rationale for the trial and the definition of an educational intervention, which consisted in the delivery to CHWs and their team members of a training course and of an action-oriented guide for HVs to pregnant women, mothers and their infants. Within the trial, the training was informed by the pedagogy of autonomy and problem-based active methodologies, while the action-oriented guide provided instructions on what should be asked, observed, identified and done by CHWs during each HVs, from conception to childbirth and postpartum, and according to a risk classification (Melo e Lima et al. 2017a, b).

The intervention was delivered to CHWs included in the intervention group, as well as to doctors and nurses belonging to the same FHTs, with the only difference being the overall length of the training (which was 32 hours for CHWs and 16 for other FHT members) (Melo e Lima et al. 2017a, b). The outcomes were improvements in self-referred CHWs' KAPs, assessed through self-administered questionnaires, and in self-reported maternal practices related to family planning, prenatal care and preparedness for delivery, child health and child development, explored through interviews (Melo e Lima et al. 2017a, b). Results reported statistically significant and sustained improvements of CHWs' knowledge and only marginal improvement of maternal practices (Melo e Lima et al. 2017a, b). The implementation process of the trial was considered successful and matched with the intended project design with respect to fidelity, reach, recruitment, dose delivered and received of the intervention, and the reactions to it (Melo e Lima et al. 2017a, b). The background, objectives, setting, methods, results and implementation process of the trial are presented with more detail in Annex IV, and in the related publications (Melo e Lima et al. 2017a, b).

Although the trial was fully implemented as intended, the expected results were only partially achieved and the trial itself missed the chance to bring evidence for explaining its partial failure. With the information originally collected on the trial it was not easy to clarify whether this was due to inherent contextual inadequacy of the intervention, or to inappropriate design and outcomes selection.

This situation is frequently observed in studies including complex social interventions, including educational ones, which adopt rigid research designs, such as RCTs (Hawe et al., 2004; Oakley et al., 2006; Sullivan, 2011). For these reasons, it has become an increasingly frequent practice to complement quantitative measurements for evaluations of interventions' effectiveness with qualitative methods to understand processes and mechanisms of change within the context of their implementation (Garbarino & Holland 2009; Guijt et al. 2011; Bamberger, Rao & Woolcock, 2010).

Process evaluations using qualitative methods can generate robust data for the exploration of why and how outcomes were achieved, and why and how were achieved in a certain way (Oakley et al., 2006; Craig et al; 2008; Bamberger et al., 2010; Guijt et al., 2011). This type of assessments unveils strengths and weaknesses of the intervention design and implementation, identifies obstacles and facilitators for a successful penetration of the intervention in a specific setting, defines key elements of

the context and its significance within the trial objectives, including the roles and dynamics of the main factors involved. Process evaluations can also be used to explore changes in the context, behaviours and mechanisms that were unplanned and unexpected, or impossible to be measured with the outcomes defined in the project. Lastly, they can contribute to identify factors and mechanisms that should be exploited for fostering positive results and outcomes in the future, within similar contexts. As observed in the background chapter of this work, these understandings are particularly essential for quality improvement interventions targeting complex and dynamic phenomenon, such as CHWs' performance (White, 2009; Patton, 2002).

To this respect, the use of a logic model to analyze and interpret the results of the case-study has a twofold intent. First, the adoption of a logic model, as described in Chapter I, facilitates the application of systemic thinking to this specific case-study, despite being related only to a modest quality improvement intervention on a restricted set of CHWs' tasks, and allows to show how and why the training and the action-oriented guide, viewed in their complexity within a real setting, interacted not only with the expected outcomes on CHWs' KAP and maternal health practices, but also with the overall CHWs' performance. Second, the use of a logic model for this case-study favoured its comparison with the one developed in Chapter I for the overall comprehension and description of CHWs' performance in Brazil, and supports a better interpretation of the findings within a broader view on the implementation of CHW national program, as well as representing a way for testing the functionality and applicability of the national model in a local context, namely in few health districts of a Northeastern city in Brazil.

In Chapter I, CHWs' performance was described as the result of the influence of a wide range of systemic inputs of the health system and the community profile and dynamics. The qualitative data produced for this process evaluation represent an added value for the analysis and explanation of these factors and dynamics, as their results attempted to check the validity of the logic model designed in Chapter I, and aimed at being generalizable to Brazil and context-independent, with a context-specific situation of CHWs' performance bounded by a specific social setting and related to restricted tasks and areas of health care.

The objectives of the study were consequently :

1. to provide a process evaluation of a community based intervention trial to improve the effectiveness of home visits (HVs) carried out by CHWs to pregnant women and mothers for exploring, understanding and interpreting, from an health system perspective, its implementation, impact mechanisms and results;

2. to draw, within the process evaluation, information on barriers and facilitators to CHWs' performance, in order to check the validity of the logic model displaying CHWs' performance in Brazil developed in the first part of the research.

2. Methods

2.1 Qualitative Research Approach: case-study

The research was designed as a qualitative case study. Qualitative inquiry was considered the most appropriate method to pursue the research objectives, as this type of research is the best fitted to explore in depth issues, events, phenomena, and complex interventions (Creswell, 2013; Creswell, 2014). Qualitative research allows voices, interpretations, observations and experiences of individuals to emerge and to be turned into valuable sources of information, understanding, theoretical explanation and hypotheses for pathways of change and dynamics within a context (Creswell, 2013; Creswell, 2014).

The type of qualitative approach shapes the research design, focus, sample, data collection and analysis, and presentation of results. In this case, the case study was the epistemological approach adopted (Creswell, 2014; Baxter & Jack, 2008; Flyvbjerg, 2011). This approach was identified as the most suitable for the research since the object (focus) was a specific bounded system, i.e. a "case", namely the process, implementation and mechanisms of influence within a trial on CHWs' performance in a predefined set of health units in the city of Recife. Across the literature, the case is defined as a "phenomenon of some sort occurring in a bounded context" (Mills, Durepos, & Wiebe, 2010; Baxter et al., 2008), where the context itself and its variables are intertwined with the phenomenon and crucial for its understanding, description and explanation. Case studies could be focused on exploring in depth programs, policies, communities or professionals groups, where potential informants and type of

observations considered relevant for its understanding can be theoretically defined *a priori* (Creswell, 2013; Creswell, 2014; Patton, 2002).

The focus of this inquiry turned around the in-depth description and analysis of a limited group of CHWs, defined by the health units involved in the trial and their proximal stakeholders, from a formal health system perspective. Stakeholders were bounded to other trial's participants and included health professionals working with CHWs within the FHTs, while the scope of the investigation was limited to an aspect of their existence, namely their interactions with a specific, yet complex, intervention for quality improvement.

When it is the unit of analysis to primarily lead the research question, and when the focus of the analysis is clear, limited and intrinsically bounded, such as in this case, than the adoption of a case-study approach is more a consequence, rather than a methodological choice (Baxter et al., 2008; Flyvbjerg, 2011).

In case-study research, other types of qualitative approaches (i.e.: ethnography, phenomenology) can coexist and be used to achieve full understanding, insight and interpretation of a phenomenon, and to uncover interactions, factors and characteristics that impact and define that specific "case" in the context (Creswell, 2013; Creswell, 2014; Patton, 2002; Baxter et al., 2008; Flyvbjerg, 2011). Therefore, data collection and analysis are not restricted or sealed into a predefined and rigid protocol. Within case-study research, the investigator uses multiple sources of information (i.e.: interviews, observations, focus groups) to explore the bounded systems in order to achieve an holistic description and explanation of "what" is happening, "how" is happening and "why".

The case-study might be considered to provide a particularistic, descriptive and heuristic research product. Particularistic, as results would focus on a particular phenomenon, group and event; descriptive, as they would enable a rich and holistic description of what has been studied; and finally heuristic as they should allow for a new understating of the case analyzed, which could expand, confirm or refute what was previously known about it (Patton, 2002; Baxter et al., 2008; Flyvbjerg, 2011). The nature of the results is considered different from other qualitative approaches, as it is expected to be more concrete, more contextual and rooted in daily practice, and to provide enough details to be potentially generalized to similar populations.

2.2 Study setting

All field activities, including observations, focus groups discussions and interviews, were held within the city of Recife and were specifically oriented to investigate factors and dynamics of CHWs and their FHT members within their communities in the three health Districts included in the project (Annex IV).

2.3.Sample

The sample for this research was defined according to a non-probability sampling strategy, since the reach of the case study could lead to a *a priori* and non random definition of the population of interested (Patton, 2002). Purposive sampling was the technique adopted, which relies on the subjective judgement of the researcher to assess whether the sample selection properly fits with the design, object and aims of inquiry (Patton, 2002).

Total population sampling, which is a specific type of purposive sample, was chosen to include the entire population involved in the trial as direct recipients, and belonging to both intervention and control groups. This sampling strategy was considered appropriate especially for assuring completeness of views from a formal health system perspective, including full representation of all CHWs, nurses and doctors who received the intervention, and those who work within the same contextual conditions and might receive the same intervention in the future (Patton, 2002).

In this research, the health units and the health professionals belonging to the intervention arm of the trial represented a specific category component of the case-study. The decision to expand the investigation to the control group was aimed at assuring a more compelling interpretation of what, how and why context variables influenced the process, implementation and mechanisms of the study, by representing greater variations amongst a range of similar and potentially contrasting cases (Creswell, 2013; Creswell, 2014; Patton, 2002). Their inclusion was aimed at increasing the precision, reliability and stability of data, strengthen the internal validity of findings, but also allowing for a more comprehensive picture of their context to assess its generalizability across Brazil.

As their number was small and the setting was bounded, a total population sampling avoided a further reduction of the sample prior to the invitation of participants, which would have compromised the possibility of having a comprehensive picture of the case studied.

At the end of the recruitment process, the total sample purposively selected included 73 CHWs, 11 nurses and 8 doctors belonging to both groups of the trial and working in all three districts involved in the project (Table 19).

Table 19. Final sample considered for the qualitative research

Participants		Group of the trial		N' of FHTs represented	N' of Districts represented
Role	Total sample	Intervention	Control		
CHWs	73	31	42	12	3
Nurses	11	7	4	11	3
Doctors	8	3	5	8	3

2.4 Field methods

Field methods included focus group discussions with CHWs, semi-structured interviews with nurses and doctors, ethnographic observations of a sub-set of the sample and feedback sessions with all informants. Field work was developed in two phases; the timing and methods selected had to balance ethical considerations, limited human, economic and time resources, and the maximisation of internal and external validity of the case-study. The rationale for the selection of methods is reported under each relevant section.

2.4.1. Aims and timing of data collection

The first phase of data collection was the most relevant and intense, and was held 10 months after the delivery of the intervention, from August to September 2016. Within this period, focus groups and interviews were undertaken to collect data across all the subjects included in the sample. These data represented the major source of evidence and provided the material for structuring the second round of field work. This latter phase, which was run between March and May 2017, included structured feedback sessions with all informants reached during the first phase and ethnographic observations within a sub-set of FHTs. Preliminary findings based on the first round of

data collection were cross-checked and validate collectively by all informants during feedback sessions, and through the first hand perspective of the researcher during field observations. This phase was aimed at increasing the trustworthiness of the overall research, i.e. at gaining a deeper understanding on the findings and the phenomenon to better frame the results within the richness of the context and its dynamics, and at strengthening the credibility, transferability, neutrality, consistency and conformability of the researchers' interpretation (Lincoln & Guba, 1985; Dye et al. 2000; Punch, 1998).

The number and the timing of data collection sessions, as previously mentioned, were bounded by practical constrains and limited resources, but also appropriate to fit the aim of the study. The timing of the first phase depended on two major factors. First, the availability of the researcher to conduct field activities was only posterior to the delivery of the intervention; therefore, it was not possible to set multiple data collection points that could have also captured changes, insights and dynamic processes during the delivery of the intervention and right after it. Being compelled to limit the number of data collection sessions, the second reason was related with the intervention itself, which focused on CHWs' home visits to pregnant women and mothers from the first trimester of pregnancy up to the first few months of life of the babies. A 10-month period between the delivery of this intervention and data collection with participants to the intervention group was considered essential, since under these circumstances, it was possible to explore also the experiences and views of health professionals connected with the intervention and its effects on mothers who were followed up during and their gestation and after the birth of their baby. The second window of field work was connected with the need to analyze the data collected during the first phase and produce relevant material for structuring further observations and cross-checking the findings with the informants.

2.4.2. Invitation to the study and ethical considerations

Standard procedures for approaching participants invited to take part in focus groups discussions and semi-structured interviews were similar. All invitations directed to health workers and professionals were facilitated by the principal investigators of the trial (Melo e Lima, 2017), which were already familiar with professionals and local authorities, and where sent in advance to allow participants to plan adequately their time and obtain work permits when needed.

All potential participants were informed about the study's rationale, objectives, nature, risks and expected benefits. Participants were also informed that all discussions and interviews would have been audio recorded and registrations transcribed.

To increase confidentiality, data management of and access to digital records, transcripts and field notes would have been left only to the primary researcher of this case-study, while quotations used in reports and extracted from transcripts would have used numbers instead of names. Participants were informed that anonymity and privacy of information and identity would be preserved in data analysis. Questions related to the research were welcomed and were answered before participants were asked to sign a consent form.

Participation was voluntary. Those who accepted were provided full explanations about confidentiality and anonymity and their consent to be interviewed and audio recorded was obtained. All discussions, information sheets and consent forms were provided in Portuguese and one copy left to the participant (Annex V).

The Ethics Committee of IMIP approved the study (n º 952.635 and 970.358 - 10/02/2015) and relevant health authorities were informed about the study, to allow the participation of CHWs, nurses and doctors and avoid penalties for not providing service during working hours.

Participants were also informed that no incentive would be provided, with the exception, for attendees to focus group discussions, of refreshments and transport from their health unit to the study location.

2.4.3 First phase of field work

All qualitative investigations focused around key themes and sentences that were structured in a topic guide used to conduct discussions and interviews, while simultaneously favouring participants to elicit broader responses, particularly stories, emotions, contrasting opinions and conflicts.

Investigations sought to explore and cast new light on factors and dynamics that could impact positively and negatively on CHWs' performance and its potential effectiveness in their routine work, as well as a consequence of the intervention, with a focus for maternal and child health.

The assumption behind the definition of core themes and sentences was that CHWs' performance is subjected to the influence of two major contextual determinants: the formal health system and the community system (Schneider et al., 2016). These concepts are backed up by international literature on CHWs performance and Brazilian national documents that define details and activities of CHWs programme (Chapter I; MoH, 2012; Glenton et al., 2013; Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015; Schneider et al., 2016).

Key sentences were: "*barriers and facilitators (factors and dynamics, internal and external to health units) to quality improvement of CHWs' daily activities*", "*barriers and facilitators (factors and dynamics, internal and external to health units) that impact on CHWs' performance*", "*barriers and facilitators (factors and dynamics, internal and external to health units) that shape and impact CHWs and team relationships*", "*barriers and facilitators (factors and dynamics, internal and external to health units) that shape and impact CHWs and community relationship*", "*barriers and facilitators (factors and dynamics, internal and external to health units) that shape and impact CHWs' preparation, organization and practice, especially for home visits*", "*barriers and facilitators (factors and dynamics, internal and external to health units) that shape and impact CHWs' preparation, organization and practice, especially for maternal and child health*", "*positive and negative factors, dynamics and consequences of the training and guide delivered as part of the trail intervention on CHWs*", "*positive and negative factors, dynamics and consequences of the training and guide delivered as part of the trial intervention on team work*", "*positive and negative factors, dynamics and consequences of the training and guide delivered as part of the trail intervention on the relationship CHWs-patients*".

The topic guide served the researcher to standardize data collection and manage communication needs and barriers across different groups of informants in order to grant mutual understanding and successful sessions. For these reasons, the content and jargon of the guide were pilot tested with a group of CHWs, nurses and doctors that were not involved in the trial, but similarly employed in the primary health care sector, and modified accordingly.

The guide was divided into three major blocks: an introductory one, with the presentation of the objectives, methods and participants of the research, including the profile and role of the researcher; a central one, with core elements of the investigation

and the list of themes and sentences coupled with notes derived from the pilot testing on how to frame the same question to a different audience; and a closing one, with conclusive remarks on the research process and future steps deemed to be recalled to research participants.

The guide was conceived as a semi-structured tool for balancing the researcher's needs and perspective , which require standardization, and the unique, but diversified, views of participants, which require flexibility (Merriam, 2014). On one side, standardization, reached by having granting a predetermined set of topics across all data collection sessions, allowed for comparisons across perspectives of different groups of individuals and professions in relation to similar experiences. On the other side, the flexible use of key sentences, their order and their wording, favoured the adaptation of the researcher to the context and the better exploration of emerging worldview and ideas of the respondents (Merriam, 2014). Audio recording was available during all sessions to consent the researcher to add further notes on the responses and their transcripts, including non-verbal behaviours and the general climate.

2.4.3.1 Focus groups discussions with CHWs

All CHWs who participated in the project, as part of the intervention or the control group, were invited to participate to focus groups.

Focus group discussions were found to be the most appropriate method for exploring views, experiences and opinions of CHWs on the research subject, namely CHWs' challenges and opportunities in relation to their performance and routines (before and after the intervention), within their complex and dynamic environment and network. Being centred on a defined collective phenomenon and identity, focus groups were thought to facilitate, more than individual interviews, comparison of different perspectives about the same social practice and context, to enhance chances of critical reflection about issues affecting everyday's life of CHWs, which are not normally discussed, and to access information on topics, such as relationships with members of the team and the community, that would have been probably difficult to disclose to strangers with individual discussions (Creswell, 2013; Creswell, 2014; Patton, 2002).

A total of 73 CHWs representing all 12 FHTs attended focus group sessions. Out of the total of CHWs involved in the trial, only 5 were missing from the control group, while all 31 CHWs belonging to the intervention group participated in the discussion.

Focus groups were organized outside the health units, in a neutral space, to allow CHWs to freely express opinions related to their work with other health professionals working with them in team, and their communities.

Discussions were held in six sessions of 2 hours approximately. Three were hosting from 10 to 11 CHWs belonging to the intervention group, and other three from 13 to 15 CHWs of the control group. Within each group, CHWs were selected to differentiate their origins, here defined by their affiliation to FHTs and Districts. This criteria maximized the variation of participants within each group, in order to assure that discussion amongst CHWs could benefit by the intervention of peers employed in different units, rather than colleagues who share daily the same challenges and opportunities (Table 20).

Table 20 Composition of the focus groups discussions

Group	Session number	Total of CHWs	Total number of FHTs represented per group	Total number of Districts represented
Intervention	1	10	3	2
	2	10	3	2
	3	11	3	3
Control	1	13	5	3
	2	15	4	3
	3	14	6	3

During the sessions, each participant was assigned with an ID number by the researcher who drew a map of them to facilitate the record of their contributions and to match them with the focus groups transcripts afterwards.

The number of sessions had to balance the needs for in depth investigations into CHWs' views and experiences with logistical and financial constraints. To secure the attendance of CHWs, District managers and coordinating nurses of each family health team had to approve the activity, while transport and food for all CHWs had to be organized and granted.

Although the number of sessions was limited by external constraints, the saturation of themes and contents was reached within the reports of the intervention and the control groups; therefore, the number was a considered sufficient to fit the purpose. Additionally, the freedom of expression and dialogue exhibited by participants during focus groups, as well as the depth and breadth of their discussions, decreased the chance to get new insights on the research themes through in depth interviews with CHWs, or a sub-set of them.

2.4.3.2 Semi-structured interviews with nurses and doctors

A total of 19 semi-structured interviews were held with 11 nurses and 8 doctors, representing a total of 11 FHTs for all three districts. Only one nurse of the intervention group was not reached, while all three doctors who took part to the training accepted the invitation for taking part in the discussion.

Interviews were preferred to other type of data collection methods since they are thought to be the best choice for conducting intensive case-studies on few selected individuals (Patton, 2002; Merriam, 2014). Moreover, interviews were held separately with each individual in order to facilitate the exploration of team dynamics, including sensitive issues, such as the relationship between health professionals belonging to different professional categories, which would have been difficult to capture otherwise. Collective methods of discussion, such as focus groups, would have challenged the possibility to freely express experiences and opinions regarding colleagues and team members (Patton, 2002; Merriam 2014).

As previously mentioned, the semi-structured format of the interviews permitted to explore a standardized set of themes by the interviewer, but at the same time allowed for new insights and ideas that could be further investigated and that could emerge through the interviewee words (Creswell, 2013; Creswell, 2014; Patton, 2002).

To grant participation and privacy of respondents, the location of all interviews also varied accordingly to interviewees needs and data protection.

2.4.4 Second phase of field work

As earlier mentioned, the second phase of field work was mostly aimed at increasing the trustworthiness of the evidence collected through the first round of data collection. During this stage, multiple sessions of ethnographic observations and feedback meetings with all informants were used to reduce potential biases in the interpretation of findings, by attempting to reach a deeper understanding of, and fidelity to, the reality explored, by cross-checking information retrieved in the first phase of field work with all case-study participants, and by further paying attention to the clarification of emerged concepts, their connections and interactions (Lincoln & Guba, 1985; Dye et al. 2000; Punch, 1998).

Both inquires were structured around the preliminary findings obtained for each key sentence included in the topic guide used in the first phase.

Field observations and feedback sessions were only recorded manually in a diary; notes were later transcribed and managed together with the data obtained in the first phase of field work as explanatory and descriptive comments and examples in support of the available data, as well as remarking notes to give emphasis on confirmatory evidence, to lessen the likelihood of contradictory findings and to modify or delete erroneous interpretations.

2.4.4.1. Ethnographic observations

A period of one month was spent for ethnographic fieldwork. Ethnography, when associated with the analysis of an intervention, has been found to be a valuable immersive approach in revealing insights that may be hard for implementers and recipients of that interventions to articulate due to the familiarity with their daily practice, and in showing how these activities are unfold in their social and wider contexts (Spradley, 1980; Evans & Lambert, 2008; Creswell, 2014). This approach holds great potential for getting firsthand data from an external observer and an holistic comprehension of how individuals experience a phenomenon, but also for looking at how and why context, human factors and situational interactions are played out over time in their complexity (Spradley, 1980). When associated with other methods of data

collection, such as focus groups and interviews, field observations provide a strong technique for triangulating emerging findings (Merriam, 2014).

In this phase of data collection, the fieldworker was principally observing, seldom asked questions to the actors involved, aiming only at clarifying their practices, and bringing light to the logic, concerns, classifications, processes and meanings that emerged in the field (Spradley, 1980; Evans et al., 2008; Creswell, 2014).

Field observations were run in 4 FHTs, and lasted one week each. The duration of ethnographic work was bounded by resource constrains, while the selection of FHTs was guided by convenience choices. First, FHTs had to be complete at the time of observation, so all health workers and professionals had to be present in their FHUs. Second, FHTs had to be based in fully functioning health units, that is in an environment and infrastructure that was not under construction or reconstruction. Lastly, were considered for observations only FHTs that were more keen to accept an external researcher.

Observations of CHWs and their teams were structured around the direct scrutiny and check of preliminary findings obtained from data collected in the first round of field work for each of the key theme investigated.

To this purpose, the main perspective of inquiry adopted was that of CHWs, rather than health professionals or community members. Observations included their physical settings (outside and inside health units), their role and the one of other actors involved (including team members and community members), their planned and unplanned activities and interactions (as part of a team, and as individual health workers), their conversations and content, the meaning they attribute to factors, persons and events, might this be transparent, non verbal or symbolic, and their attitudes (Merriam, 2014).

During field sessions, the researcher followed each team from the beginning to the end of the working day, in the attempt to observe as much as possible patterns of events and variations. Being semi-structured and set into a dynamic context, observations included a variety of situations and actors that were difficult to get anticipated, but who became relevant for grasping an overall picture of CHWs practice.

The researcher played the role of an observer, while being a participant, since the research activities were known to the group observed, but interactions allowed to

establish a close connection and an insider's identity, without, however, turning to be an active member of the group (Adler, 1998; Merriam, 2014).

2.4.4.2. Informants' feedback sessions

The last step of field work was represented by informant feedback sessions, where preliminary findings were reported to case-study participants (CHWs, nurses and doctors of the control and intervention group) in order to check their accuracy and the interpretation of the researcher, so to improve the credibility, validity and transferability of their content.

Feedback sessions are a participatory technique, also known as member checking or respondent validation, widely acknowledged across the literature as a method for decreasing the misinterpretation of results and researcher's bias (Creswell, 2014; Lincoln et al., 1985; Dye et al. 2000; Punch, 1998; Tanggaard, 2007; Morse et al., 2002). This approach enables participants to gain control over the authenticity and truth of the representation provided by the researcher on their interviews and focus group discussions, as well as to provide critical analysis and comments (Creswell, 2007).

A total of three feedback sessions were held with all informants. Attendance to the events was high, since all CHWs, and 80% of health professionals who took part in the first round of data collection participated. One sessions was dedicated to CHWs belonging to the control group, another with CHWs who received the intervention, a third one with nurses and doctors. These meetings took place together with the official closure of the overall trial, which, on ethical grounds, granted to all participants of the project a reward, namely the full delivery of the training and the action-guide to CHWs and health professionals of the control group, while a shorter session to refresh some contents and themes for those who formerly received the intervention.

During each session, preliminary results were presented to its relevant audience with a power point presentation in bullet points, a short narrative and key quotations for each theme of inquiry. After the presentation, participants were invited to provide their feedback and comments, in order to identify over or under emphasized points, vague descriptions, errors, biases and wrong assumptions in the data. Manual notes were taken during the sessions by the researcher, who later transcribed them and incorporate

them under each relevant section for the usage previously described. Group discussions lasted 1 to 2 hours approximately, and were facilitated by the researcher.

2.4.5. Trustworthiness and rigour of the research

Qualitative inquiries, no less than quantitative researches, have to grant rigour and trustworthiness in their conducts and results, although the standards and methods used in the two approaches differ, as diverse is the type of reality they attempt to represent (Firestone, 1987). Trustworthiness and rigour in qualitative research are essential elements for increasing confidence in the investigations and for promoting the use and adoption of the resulting evidence, for example when developing public policies (Lincoln and Guba, 1985). Within the literature, these standards are often referred as internal and external validity, or similarly labelled as reliability, credibility, transferability, dependability and conformability (Lincoln and Guba, 1985).

Internal validity in qualitative research deals with the matching of findings with the phenomenon represented, while reliability defines the extent to which research findings can be replicated, and its results are consistent with the data collected (Lincoln and Guba, 1985). By investigating multidimensional and dynamic realities, these dimensions do not coincide with a unique and unchangeable truth, but with the credibility and consistency of the analysis and interpretations provided by the researcher on what is studied, through the choice of data and working tools, which are usually human beings (Merriam, 2014). A number of strategies were identified across the literature to strengthen the internal validity and reliability of qualitative studies, and several of them were adopted in this case-study (Merriam, 2014).

Firstly, amongst them, the use of multiple methods and sources for data collection, here represented respectively by the joined utilization of semi-structured interviews, focus groups, observations and feedback sessions on one side, and by the engagement of CHWs, as well as nurses and doctors on the other, which allowed for the triangulation of the information presented, that is for the comparison and cross-checking of the phenomenon and its representation from different perspectives (Patton, 2002).

Secondly, as previously described, the validation of preliminary findings through feedback sessions with informants, which benefited the research by reducing possible misinterpretations of participants' views (Maxwell, 2005).

Thirdly, the critical reflection of the researcher as a self and human being with respect to the research project, which contributed to the reduction of internal bias. In qualitative research, this analysis is referred as reflexivity and assume that the role of the researcher is clearly explained, since her/his positioning in relation to the object of study and participants could influence the interpretation of results, for being the instrument of data collection and data analysis (Tanggaard, 2007; Creswell, 2014; Lincoln et al., 1985; Maxwell, 2005).

The researcher was not part of the research team who implemented the trial and met for the first time all CHWs, doctors and nurses during the first phase of field work. This allowed participants to dissociate the researcher from the intervention, and freely and objectively express their opinions. During the first phase, the researcher acted with an *ethic* perspective, that is as an external observer who attempted to analyze from the outside and objectively the case studied (Punch, 1998). The main expectations of the researcher, also shared with the participants, were to obtain: a comprehensive picture of what happened as a consequence of the intervention, hints about what could be considered valuable to promote for future implementations to other groups of CHWs, what should be changed, and what would be impossible to achieve, as well as a clear picture of all factors and dynamics that influence daily activities of CHWs in order to possibly present findings to relevant authorities and promote improvements. During the second phase of the data collection process, the researcher relationship with study participants was already established and based on trust and reciprocal confidence, also due to the presence in field work activities (home visits, educational groups, team meetings). However, the researcher attempted to act as neutrally as possible in the field, and to avoid actions that could bias the opinions and behaviours of people observed.

External validity refers to the possibility of generalize the results obtained within a qualitative research to other similar settings, a concept that was also labelled as transferability by Lincoln and Guba (1985). Accordingly to the literature, differently from quantitative research, the generalizability of findings within a qualitative inquiry is left to the research users, who take a primary role in this assessment (Lincoln and Guba, 1985).

To enable users of evidence in this decision, qualitative researches and researchers should provide them with enough details for possible comparisons (Lincoln and Guba, 1985). Within this case-study, two major arrangements were adopted to enhance transferability, namely the use of a thick and rich description in relation to the setting and the context of the phenomenon studied, namely CHWs' performance and improvements within a nationwide and standardized programme, and the effort to ensure the maximum variations of the sample selected for data collection with all methodologies (Maxwell, 2005).

2.5. Data analysis

All qualitative data were audio-recorded and transcribed into Word documents by an external person to the research who was familiar with the primary care system in Brazil. All the contents were in Portuguese and analyzed in the original language.(Due to the large volume of verbatim transcriptions, quotations will be only presented as an annex). Transcripts were later entered into Atlas.ti for analysis, together with notes related to field observations and participatory discussions.

Data were analyzed using a pragmatic approach according to principles of applied thematic analysis, and specifically adopting a thematic framework approach (Aronson, 1994; Boyatzis, 1998; Ritchie et al., 2003, Guest et al., 2012).

The data analysis involved different stages.

Stage 1. Transcripts were read multiple times in order to reach familiarity with the data and identify, inductively and driven by the content, recurring themes and analytic categories. In this first stage, records were read by group of informants defined by their professional category and their involvement with the trial: CHWs of the intervention group, CHWs of the control group, nurses of the intervention group, nurses of the control group, doctors of the intervention group, doctors of the control group.

Stage 2. In this second stage, a preliminary set of categories was included for the data analysis of all the sample: a) experiences and views connected with the intervention; b) experiences and views connected with overall CHWs' routine practice.

Stage 3. In this third stage, the full codebook for the categorization of data was developed. Categories identified during the second stage were further refined throughout an iterative process that included inductive and deductive steps in the attempt to check all data against the logic model developed in Chapter I for the analysis of CHWs' performance. The deductive approach was adopted to facilitate the interpretation and comparison of findings with a theory-driven model, based on evidence, that account for barriers and facilitators of CHW program implementation in Brazil.

Within the first category "experiences and views connected with the intervention", which was mostly used for the analysis of reports of the intervention group, irrespectively of their profession, the sub-themes emerged were classified as:

1. "Impact of the intervention on CHWs' performance", which was further articulated as "Impact on CHWs' KAP", "Impact on the relationship between CHWs and the team", "Impact on the relationship between CHWs and the community";

2. "Views on and experiences with the intervention package", which was further articulated in "training" and "Action-oriented guide"; and lastly

3. "suggestions on how to improve the intervention".

Within the second category "Experiences and views connected with CHWs' routine practice", which included the analysis of all participants, irrespectively of their group or profession, the sub-themes that emerged were:

1. "Overall perceptions on CHWs' performance";

2. "Barriers and facilitators to CHWs' performance", which were further articulated as "Formal health system inputs" and "Community system inputs".

Stage 4. In this stage all verbatim sections of the transcripts were codified accordingly to the codebook developed in stage 3 and, when needed, the codebook itself was iteratively re-shaped and refined.

Stage 5. All data codified under each theme were compared, contrasted and synthesized in a narrative that take into account the views of all participants, as well as the observations and the results of the feedback sessions.

Stage 6. The categories and themes identified were mapped within a logic model attempting to present a comprehensive and dynamic display of interconnections between each category, themes and their impact on the intervention in the context.

3. Results

The primary products of the process evaluation will be presented through narrative summaries, and ultimately displayed and interpreted in a logic model. The model is intended to visually disclose the 'black box' of the trial and show the pathways of change from the intervention inputs through to the measured intervention outcomes, incorporating proximal mechanisms and the conditions assumed to be required in order to support change.

Results will be presented under two main sections, the first aimed at reporting the positive and negative experiences and views of the intervention group in relation to the intervention itself, its components, its impact on their practice and their suggestions for future improvements, while the second will describe the perceptions and opinions of all trail participants concerning barriers and facilitators to CHWs' performance under their routine activities.

3.1. Views and experiences related to the intervention: impact on CHWs' performance

Interactions with all informants belonging to the intervention group (CHWs, doctors and nurses) showed in a very consistent and homogeneous way across all types of health professionals that the experience of being involved in the intervention, and particularly in the training, was extremely positive. None of them reported negative occurrences as an effect of the intervention, although there was general agreement across all discussions and observations, that the implementation of what was learnt by CHWs during the training, and especially the (effective) use of the guide in the field, was difficult.

Three limitations directly connected with the intervention were emphasized: the difficulties to translate its contents into practice, the lack of incentives for promoting changes and its use, and poor support and supervision.

However, major sources of constrains were external, as observed during field visits and unanimously attributed by informants to systemic barriers to CHWs' practice, which will be the object of discussion in the next section.

3.1.1 Impact on CHWs' KAP

3.1.1.1. Positive experiences

There was agreement across all informants that the training and the guide positively influenced CHWs' motivation and self-confidence in delivering services to pregnant women and mothers. According to doctors and nurses, the renewed interest showed by CHWs as a consequence of the training was remarkable, and CHWs appeared more proactive than before with respect to their duties and particularly to HVs.

A nurse reported CHWs' self-involvement and collaboration for the organization of external events which were not compulsory, such as the "*Semana do bebe de Recife*", where they could use the new acquired knowledge on ECD.

The intervention was unanimously thought to bring major advancements into CHWs' knowledge, since everyone had the perception that it improved and expanded, particularly amongst the relatively new CHWs, who had never received any type of training, and so had to "learn by doing" and by observing their colleagues.

Based on CHWs accounts, although practice differed only marginally after the training, their activities received a stronger theoretical reinforcement, as all procedures that were previously performed mechanically during visits were, after then training, backed up with scientific background that clarified to CHWs the 'how' and 'why' of their actions, their relevance and rationale. Information received during the training course was acknowledged by all of them as an important value, a source of power and "*a gift to share with their patients*".

After the training, according to all informants, two areas mostly benefited within CHWs practice: the use of a risk classification, and the scope and clarity of observations and counselling. In addition, they all recognized that these effects expanded well beyond these aspects and triggered virtuous dynamics in their relationships with the team and their patients. An example in support of this statement that deserves particular

attention is the case of the introduction of ECD contents within the training and the guide, and it will be reported in Box 5.

Box 5 The case of CHWs' performance on ECD

This theme, which was new for the majority of CHWs, raised a lot of interest in all. CHWs were reporting the specific training sessions devoted to ECD as rewarding events, which empowered them and strengthened their motivation. CHWs clearly perceived the improvements in their knowledge and performance connected with this topic.

During ethnographic work, CHWs' enthusiasm on promoting ECD practices and attention to potential risk factors was frequently observed. During the majority of HVs delivered to pregnant women, or new mothers, CHWs sought information about dimensions connected with ECD, such as reading habits and play, or used simple working tools to monitor ECD progresses; it was the case, for example, of the use of a little game to monitor the visual responsiveness of babies around their first months of life.

Some of them went far in their commitment and bought some baby books out of their pockets to facilitate their work when advising mothers to read to their babies.
Having understood the effects of caregivers' behaviours and interactions with their children on child development boosted CHWs' motivation to disseminate this new knowledge as a social mission. CHWs recognized the great potential of ECD promotion for improving the future prospects of children and the whole society and to reduce the impact of risk factors such as violence and poverty within their communities.
Moreover, the scientific ground provided during the training for explaining the effects of caregivers' behaviours on children was used during home visits to explain to parents the value of early interactions and simple practices, such as reading and talking to and playing with their children.

Talking about feelings and relationships strengthened the holistic nature of the service delivered by CHWs to mothers, and was seen as a way for attracting their attention, curiosity and willingness to act according to their advice. Moreover, they reported that mothers felt that what was promoted was easy and inexpensive.

Some CHWs reported about successful cases, where they were able to follow the pregnancy and early life of the baby, where mothers who were advised about ECD practices showed an increased attention for the care of their baby and attempted to implement what they were suggested to do. In one case, which seemed surprisingly for CHWs, this improved attitude for positive interactions with the baby was also transferred to the father.
Lastly, it was particularly evident with the case of ECD promotion, how the training and the guide enhanced synergy and uniformity of orientations between CHWs and nurses. For example, CHWs reported the experience of one nurse who brought some books to transform a little corner of their unit in a baby-friendly space where CHWs' messages to mothers were reinforced during consultation.
Not all experiences on ECD, however, were successful and there were also reports of resistances from health professionals and community members. For example, in one team the doctor discredited ECD practices, since they were considered useless in

principle, as they were referring "only" to emotions. This sceptical attitude was also found in some mothers, who could not recognize the value of behaviours and personal interactions with their child as a determinant of their health and development. This was reported to be also the consequence of the influence by other family members.

In one case, a nurse said that she could clearly distinguish within CHWs those who attended and those who did not attend the training.

All nurses observed that the project, and especially the availability of a guide, improved the objectivity, completeness and systematization of CHWs' observations, and facilitated their organization of work and referral to the team about critical situations and risk factors.

At the same time, CHWs reported that the scope of home visits got broader as a consequence of the training by going well beyond basic technicalities, such as the control of vaccine updates, their observations and counselling were more focused than previously, they felt alerted on a broader range of contextual factors, and their approach to mothers and babies became more humanized.

These perceptions were reinforced by the views of nurses and doctors, who observed an improvement of CHWs' attention on health issues, through the reports shared by CHWs after their activities. Reports of home visits, for example, included aspects connected with emotions and the social environment. In line with what reported by CHWs, CHWs appeared to expand their focus from a narrow perspective oriented on disease, clinical and biomedical aspects of health, such as anthropometric measurements, to more holistic view of health, such the importance given to ECD.

3.1.1.2. Negative experiences

Although the increase of CHWs' motivation was marked, a few informants amongst CHWs, nurses and doctors, explained that the absence of incentives for the systematic use of the guide, for example by District authorities, could have decreased their willingness to use it. For one doctor in particular, the lack of incentives hampers the promotion and introduction of whatever new tool and task.

Many CHWs described their difficulties with the use of the guide, and their inability to understand how to use it during home visits, and how to translate its content into

practice. This difficulty was also supported by ethnographic work, where it was possible to observe that most of home visits were not well structured by CHWs. For example, many visits are held at the front door, so that CHWs could difficultly focus on the guide; additionally, conversations were mostly driven by the needs and interests of patients, and CHWs need to adapt to this dynamic for introducing new contents.

For these reasons, many of CHWs admitted that they soon gave up using the guide, while few others not even attempted. According to nurses and doctors, and in line to what observed during interactions with CHWs, this was more common among older CHWs, who, also due to their lower educational background, experienced more difficulties in understanding its use.

Moreover, some doctors and nurses expressed their concern regarding the deficiencies in the system adopted for monitoring and evaluating the application of new knowledge and use of the new tool. In their views, the absence of any external support, monitoring and supervision for assisting the practical translation of the guide and its content into CHWs activities was considered a pitfall of the intervention.

At the same time, CHWs widely shared the view that the positive effects of the intervention to their practice were reduced by obstacles that went well beyond the specific objectives and activities of the project. CHWs acknowledged that they lacked sufficient time, during each visit, to follow each step of the guide, and provide comprehensive counselling and orientations accordingly to the stage of the pregnancy or the age of the baby. Difficulties were also related to other contextual factors. For example, one health unit was under reform, another just moved at the time of the project and was undertaking a process of registering and mapping the families under its responsibility, which focused the activities of CHWs in collecting data for that purpose. One of the FHUs had to be closed for some times due to gunfire and violence. Additionally, all teams participating into the trial had to face a change in the information system requirements, including data collection forms, registers and data entry methods, during the period of project implementation. Accordingly to CHWs, this new system had plenty of pitfalls, and since data collection is one of their duties, the adaptation process was time consuming.

3.1.2 Impact on the relationship between CHWs and the team

3.1.2.1. Positive experiences

Accordingly to CHWs, this project improved the uniformity of language and objectives of service delivery across the team. As such, counselling to mothers got stronger, as inputs received by all health professionals at home and within the FHU were all coherent.

Under these circumstances, a few CHWs described how their nurse was better able to reinforce some messages, complement their orientations, and even manage to provide useful materials, such as books for children, which could be given to mothers to implement the suggestions received. This experience was backed by the reports of nurses, who similarly found that their relationship with CHWs, and to certain extent, with their patients, improved. First, nurses observed an increase of the receptiveness of mothers during consultations on certain topics, especially connected with ECD. Nurses could perceive that mothers had been already informed by CHWs on certain issues, and the reiteration of the same orientations at the unit level could reinforce its importance, as well as the role and credibility of CHWs. This positive dynamic was felt to improve mothers' confidence in CHWs and motivation to comply with their advice.

All participants recognized that the decision of extending the training to all team members was strategic. CHWs emphasized the importance and value of having the nurses on the same page, while the role of doctors was believed as less important.

One of the nurses recognized that the more people are involved to promote a change and are aligned with a same vision and pathway, the more that change is likely to happen. For example, she reported her experience with the use of the guide and she described that she used it to structure further updates for CHWs and organize case studies as a refreshment about its use.

During ethnographic observations, a vibrant and positive atmosphere and a cooperative environment was definitely perceived across those FHTs who took part in the intervention, when attempting to set up events that would have promoted new and shared knowledge. It was the case, for example, of the organization of educational groups with young pregnant women, where the alignment and support between health professionals, especially the nurse, and CHWs, was strategic for the achievement of a common goal.

Although not all doctors and nurses belonging to the intervention group got truly engaged with the project by participating in the course, and although they could not devote sufficient time to properly supervise and encourage the translation of new knowledge and skills into CHWs' daily practice, the value of having them aware of the overall programme was recognized by all CHWs. Those of them who received this support, felt more empowered by other team members.

Additionally, all health professionals acknowledged that CHWs were reporting problems and doubts regarding RMNH much earlier and with more precision and detail than before, that CHWs posed new types of questions and requests for clarifications to the nurse, and that questions were better structured and used a more precise terminology.

3.1.2.2. Negative experiences

All informants acknowledged that nurses and doctors were not always able to provide appropriate support and supervision due to systemic constraints to their work.

In one FHU, a nurse did not receive the guide; as a consequence she described how she forgot quickly about it after the training. This situation challenged her motivation and empowerment for monitoring, supervising and charging her CHWs for the introduction of this new tool into their daily practice. The lack of her strong positioning and leadership negatively impacted, in her views, on CHWs' reactions to the guide.

3.1.3 Impact on the relationship between CHWs and the community

3.1.3.1 Positive experiences

The improved attention paid by CHWs to emotions and views of pregnant women and mothers, together with some suggestions received during the training for effective communication methods, were reported to decrease the distance between CHWs and their patients.

Additionally, accordingly to CHWs, their ability to refer to authoritative sources of information, such as scientific studies, examples provided during the training or the use

of the guide itself during consultations with mothers and caregivers, granted to CHWs greater credibility and recognition.

This strengthened connection enhanced the respect and trust of CHWs among their communities, the value of the visit, as well as the curiosity, interest and the motivation of mothers to pay attention to CHWs and their advice. Mothers were more keen to change their attitudes, and this was reported as particularly evident in first time mothers. When these changes occurred, CHWs felt rewarded and their motivation increased.

3.1.3.2 Negative experiences

No negative experiences were reported as a consequence of the intervention for the relationship between CHWs and their communities.

3.1.4 Training and action-oriented guide: views and experiences

There were no negative observations in relation to the training, while the guide received some critical commented by some informants related to its ease of comprehension.

3.1.4.1. Training: contents and methods

The duration of the training was felt adequate for absorbing the contents provided. Trainers' clarity and leadership, as well as training methods, were well received by CHWs and other informants. The fact that the training was based on active learning methods, with dynamics and case studies that kept high the level of attention, constructively facilitated the comprehension of what was taught, increased the sense of usefulness of the training and its adherence to real life settings.

The content of the training was also considered unanimously as very interesting, relevant and useful for CHWs' practice. The themes selected increased CHWs' motivation to learn as a way of improving their practice. They opened up to new horizons, recalled contents already learned and used daily, and backed up their routine actions with scientific knowledge and evidence.

According to nurses, this was crucial for those CHWs who had never received a training before, but also for older CHWs, who were helped to refresh topics where they had gaps or outdated information.

The ECD component of the training was particularly welcomed. The training section on ECD practices, for example, was totally new to the majority of CHWs and stimulated their attention and willingness to learn and translate this into practice. Ethnographic observations held with CHWs belonging to the intervention and control groups allowed to single out how the ECD contents were truly innovative elements for CHWs, since only the intervention group of CHWs was able to promote ECD practices and to pay attention on ECD risk factors during home visits.

Others themes, such as vaccines, represented an update within a continuously changing practice which was felt as non reflected in their CPD opportunities.

Similarly, the organization of content into a "risk-based approach" was welcomed positively and acted as a recall of the AIDP, i.e. the Brazilian version of WHO Integrated Management of Childhood Illness, training for those few CHWs who had received it long time before.

3.1.4.2. Action-oriented guide: content, format and use

The guide was used in daily routine activities only by a minority of CHWs. Accordingly to their experiences, the use of the guide was not homogeneous, but was customized by CHWs to best fit their own needs and work organization methods. During ethnographic sessions, for example, it was possible to observe that some CHWs kept always their guide in their bags, while others in a room specifically dedicated to CHWs' activities. It was remarkable the experience of one CHW, who personalized the guide by binding together with it some white sheets that could enable her to take notes on her patients for monitoring their improvements and taking care of their risks.

Amongst those who used it, the guide was perceived as an empowering source of information and was adopted as a consultation tool for study and clarifying doubts during their home visits, but also as a framework to structure their visits, including observations. Some CHWs reported that using the guide for consultation was effective in bringing new insights into the perception of health related risks even beyond home visits.

All users agreed that the structure of the guide, organized by gestational age and child age and by risk classification, facilitated its use. Health professionals considered the guide very practical, with the potential for guiding CHWs into the complexity of the realities they face, and for increasing their ability to identify relevant information within their observations and talks with mothers and babies.

The availability of the guide, and the perception that their work could be based and structured on scientific evidence, was felt as being a rewarding mechanism for CHWs and increased their confidence and motivation. Some CHWs considered the format of the guide appropriate for its use and transport during field activities, while others thought it did not fit in their bags.

However, all CHWs complained that the guide only covered issues pertaining to mothers and children, while their activities go well beyond this population, and that the guide should ideally cover other health conditions, such as diabetes or mental health. Field observations could clearly support this argument, since the overall workload of CHWs was distributed only partially to mothers and children, while a greater part was devoted to chronic conditions and the elderly population.

Lastly, few CHWs found difficult the use of the terminology of the guide and the excessive amount of information reported, which negatively impact on their ability and motivation to approach and use the tool.

3.1.5 Suggestions: how to improve the intervention

Most of the suggestions made for the improvement of the overall project were related to the guide and were coming from nurses and doctors, who reiterated their agreement with the introduction of a new tool for CHWs' work, which could structure their activities around risk factors.

Structure and format of the guide

Some nurses suggested that the guide could be plasticized to be water resistant and to allow its sustained use by CHWs in their daily activities. Also, it was emphasized that whatever tool should be succinct and practical, while its rationale well understood. These views were also supported by CHWs talks.

Diffusion, training, support and supervision

Motivation and interest of CHWs to apply new methods of work in their daily practice were reported as crucial by nurses and doctors, and would be achieved only if CHWs understood their relevance for their work. To win their resistances they suggested to promote the sharing of positive experiences of CHWs who used the tool and recognized its benefits.

Accordingly to all informants, support and continuous training are crucial for a successful introduction of new tools in CHWs' daily activities and translation of new knowledge into practice. All team members agreed that refresher courses related to the use of new tool and contents should be planned with little time elapsing between each session.

Similarly, all informants thought it was crucial to accompany the introduction of a new tool with practical field support and supervision. One nurse suggested that there could be, for example, one week of supportive supervision every two CHWs.

As successfully showed by the project, all informants supported the idea that all team members should be aware of what has been suggested and proposed to CHWs in order to have everyone on the same page and foster cooperation and support.

Accordingly to some doctors and nurses, also, the introduction of new job aids and tools should, at least at the beginning of its introduction and until its use enters into CHWs routine, be externally monitored and supported by an incentive mechanism. It was suggested, for example, that there could be a monthly meeting for discussing CHWs work and difficulties, and that monitoring should be based on targets related to the quality of the process, and not only the quantity. Within these meetings, CHWs could share their improvements in order to feed a positive and motivating dynamics among their peers.

3.2. Systemic inputs to CHWs' performance: barriers and facilitators

As described in the method section, the experiences and views in relation to the overall barriers and facilitators to CHWs' performance were analyzed jointly by all professionals interviewed, irrespectively of the trial grouping. This approach was justified by two reasons. Firstly, the familiarisation with the data showed that themes across all

informants on this topic were uniform. Secondly, the categories adopted for indexing data matched with those used under the logic model presented in Chapter I. This strategy facilitated the discussion and interpretation of the success and failure of the quality improvement intervention for HVs to mothers and children within the complexity of CHW program implementation in Brazil.

Under this section, after a brief overview of general perceptions of all informants on CHWs' performance, results will be presented following a structure similar to that used in Chapter I and thus divided for systemic inputs related to the formal health system and to the community system. Each of this section will be further detailed with relevant sub-categories, in line with the structure of Chapter I, and presented in their mechanism of action as barriers and/or facilitators.

3.2.1 Overall perceptions on CHWs' performance

The work of CHWs is unanimously considered by all health professionals who were interviewed, including nurses and doctors, as an essential component of the primary health care strategy. In their views, CHWs represent a key linkage between the community and the health units and a strategic source of information for team work.

The majority of them, however, recognized that their overall performance is often weak, with implications on team work and the community. Few doctors complained that some community members, for example, do not even know who are their CHWs and end up attending the Unit for inappropriate reasons. All informants unanimously acknowledged that most of the barriers that justify CHWs' inefficiencies are systemic.

CHWs themselves perceived the quality of their performance as frequently sub-standard and admitted that their motivation was not always strong and firm. CHWs unanimously complained that their work is more driven by the need to comply with the quantity rather than the quality of their performances. They argued that their performance cannot be standardized, as it is highly contextual and subjective, and that the organization of their work, the prioritization of tasks and the harmonization of all activities requested is hard to be achieved in daily practice. Many of them experienced frequently the inability to comply with planning their daily goals.

This situation was also strongly perceived during ethnographic work. For example, during home visits, the plan for providing support to a certain amount of patients per

day, was frequently hampered by requests of people met on the street, or within a household that presented a variety of problems. It gets hard for them, then, to dismiss requests and follow on with their planned schedule. Similarly, CHWs' individual planning, when available, was modified by the need to satisfy other requests coming from the nurse and other entities (health managers, external technical groups).

CHWs feel to act "*naturalmente*" (*na hora*, within the moment), without rigid plans, supervision and support. They reported there was no time to discuss and reflect on the work, to prioritize and better structure their activities.

These views were also shared by the majority of nurses and doctors who acknowledged the inability of CHWs to organize, prioritize and standardize their work, which decrease the efficient use of their time and the quality of service delivery. Accordingly to them, CHWs' work is not based on risk assessment, but on their personal motivation. For example, education groups with patients are only conducted when there is at least one CHW who is taking the leadership and organizes other CHWs. Additionally, they may show resistances to the introduction and use of tools and job aids that could facilitate their work, as their methods are more artisanal and spontaneous. Ethnographic observations clearly revealed the informality that moulds CHWs tools and professional identity.

As discussed with all informants and observed during field sessions, it is really common that nurses and doctors have no control over CHWs' actions, schedule and activities. On the other side, as argued by many participants, CHWs' attempts to be independent in their work organization get frustrated as they feel lack of autonomy and appropriate skills. CHWs also may feel insecure in performing their actions, and they attempt to balance these gaps by relying heavily on their personal experience and knowledge, rather than on a more objective and structured basis.

Doctors and nurses described how CHWs alone are not always able to recognize risk factors. Sometimes they refer problems to the team with delay, due to their inability to promptly perceive hazards. One doctor reported the effects of these delays in referring newborns to the Unit, and the consequent impossibility to perform all the required screening tests.

On their side, CHWs complained about a gradual deviation from their original mission, which turns out now as more oriented on papers and bureaucracy, rather than on

contact and interactions with people of their communities. According to them, the number of visits delivered to each family decreased, together with their duration and ability to follow up more closely difficult cases. Also, time to organize events that could foster community engagement decreased. CHWs perceived that their role had been gradually moved to health care rather than the health promotion, as envisioned under the official definition of their role. Ethnographic observations have emphasized the lack of attention for health promotion during home visits and within health units, especially when comparing practices between the intervention group of CHWs, who had a recent refresh of their promotional potential, and the control one.

These opinions were backed by nurses and doctors who explained how CHWs tend to adapt their performance more on a biomedical model of health than on a more comprehensive vision and that their reports to the team about specific patients were increasingly focussing on disease specific issues rather than broader social determinants. They confirmed that CHWs' role in health promotion and education tends to be weak and, with respect to mothers and children, CHWs often limit their actions to measure height and weight of babies and check immunization status. When mothers attend the Unit, then nurses are often obliged to provide the kind of advice that should have been provided by CHWs.

3.2.2 Formal health system inputs

Formal health system inputs that were described to influence CHWs' performance included all the building blocks that define the CHWs program as a health sub-system, as well as their relationship with overall the health system network.

3.2.2.1 Human resources

Health system inputs related to human resources that were described to be influencing CHWs' performance included CHWs' selection criteria and process, working conditions and preconditions, including professional status, initial training and CPD and support and supervision by internal and external members of FHTs.

CHWs' selection criteria and process

A few factors linked to the selection procedures and criteria of CHWs were reported, especially by nurses and doctors, as barriers to the effectiveness of CHWs' performances.

Concerns were reported in relation to the procedures for hiring CHWs, although the statements of informants were not aligned. Several informants, and mostly doctors, explained that a relevant portion of CHWs working in their units entered the position before the existence of a formal recruitment and selection process, which allowed the hiring of people through much less stringent criteria than the ones currently required. , Accordingly to them, this situation led to have within the pool of CHWs, some who were hired for political reasons and not for their skills or motivation, others that are more aged, have a limited literacy level, have been working in the field for more than 30 years and are consequently more resistant to learn and change their practice.

At the same time, though, it was argued that the public recognition of CHWs profession through a public selection process, although has brought value, confidence and protection to these workers, reduced the strong motivation of some of them as volunteers at the beginning of the programme. Most CHWs agreed on this point.

Residency was described to have contradictory effects on CHWs' performance. For the majority of the informants, including CHWs, the requirement to be resident in the community could negatively impact on the effectiveness of CHWs' work. Living and working in the same area could decrease CHWs privacy, and increase their emotional exhaustion for facing difficult situations and contexts without any breathing space.

Accordingly to nurses and doctors, residency might distort CHWs practice and impede to deliver a systematic and objective service. CHWs decision making in front of their peers, friends and enemies is subject to bias, as they tend to privilege people with closer connections and avoid contacts with others who may be perceived as enemies. Additionally, it might decreases CHWs' curiosity and willingness to conduct home visits and explore carefully their community. CHWs might rely on informal talks with some, and closest, community members as mediators for the diagnostics of problems affecting their patients. However, the competencies and attention of selected informants might not be appropriate for the detection of problems and risk factors.

CHWs recognize that working in the same area for a long time could negatively impact on their attention for details and lead to perform activities mechanically. One doctor suggested that this requirement should change and rotation across areas promoted.

At the same time, however, the same informants who described the challenges of residency, considered that the close ties between CHWs and their communities, which are stronger for older CHWs, could also serve as a facilitator for their practice and for their influence on community members. Residency may allow them to access information that would be difficult to obtain otherwise. Often, community members look for CHWs before any other type of service as they think that CHWs know how to be interpreters of their needs towards other health professionals.

These multifaceted effects of residency was also observed during ethnographic work. On one hand, being well known and trusted, CHWs granted access to and protection in almost impossible to reach and dangerous areas to strangers accompanied by them, these being health professionals of external technical groups or, in the case of this research, the researcher herself. On the other, however, it happened frequently to observe the negative consequences of a long-lasting relationship with the community. For example, very often CHWs not only skipped those houses where they knew that there was poor interest in them, but also lost that energy that might be necessarily required to win strong and rooted resistances.

Accordingly to doctors and nurses, CHWs behavioural profile, based on empathy and solidarity, is generally suited for capturing the realities of their community members, as they know how to adapt their communication to each individual and contextual dynamics. For example, it was observed during field work that CHWs are able to reach resistant people through some other community members who act as mediators. It was the case of an homeless pregnant woman, depended by drugs and alcohol and affected by HIV, who was never reachable, if not through her sister, who provided to take care of her accordingly to CHWs' suggestions. This understanding becomes crucial for other health professionals working in team with CHWs, as they can be advised on how to better adapt their visits to the context.

When community members recognize CHWs' role and are willing to listen to them, comply with their orientations and change their behaviours accordingly, nurses and doctors reported they could see these attitude reflected in CHWs motivation. The

emotional and personal connection between CHWs and their peers, together with the knowledge of what should be the their rights as patients, support them in fighting for their recognition within the public sphere. During field observations, this is was the case, for example, of delayed exams and appointments with health specialists, where CHWs firmly supported their patients and advice them on how to formal complain to health authorities.

CHWs' working conditions and preconditions

<u>Professional status</u>

A few health professionals reported that the lack of job opportunities motivate community members to apply for CHW posts, although many of them have educational backgrounds and personal interests and motivations which do not fit the professional profile of a CHW. This view was also strongly shared across younger CHWs. In addition, coherently to what reported by the CHWs themselves, CHWs don't feel sufficiently paid for their work and often have more than one job.

Accordingly to doctors and nurses, working conditions contribute to pushing CHWs to complain, go on strike, look for more rewarding positions, and lose motivation to improve their practice. Additionally, one nurse complained about the inexistence of professional development perspective for CHWs.

Doctors and nurses also argued that human resources were not sufficient for the amount of work requested, and reported that when CHWs leave the job, for retirement, layoff or health reasons, they are often not replaced, which consequent implications on the workload of the whole team, gaps in service delivery and community outreach.

<u>Initial training and continuous professional development (CPD)</u>

All informants agreed unanimously that training and continuous professional development plans for CHWs were poor.

The introductory and supposedly mandatory training, in their experience, was not always available for new CHWs, who are obliged to learn by doing and observing methods and behaviours from older CHWs. Accordingly to one doctor, initial training should be a basic requirement prior to the application for the CHWs post, since learning from peers is not the most effective and appropriate method.

Nurses and doctors expressed their concerns in relation to the opportunities offered for continuous professional development to CHWs, such as trainings led by academic institutions, which may lack relevance and follow up.

This concern was supported by an example provided by some older CHWs who were not able to understand why, after the positive experience of the AIDP (IMCI) training and its tools received long time before, which contributed to new practices that were introduced and monitored for a period, there was no continuity offered to younger CHWs nor refreshment and consequently got lost.

All informants recognized that even when trainings are provided, themes, trainers and methods might not be appropriate to CHWs needs and contextual challenges.

CHWs, in line with nurses and doctors, acknowledged that the diversity of the environments and social conditions where they act would require more tailored solutions. Guidelines and standards introduced during training are hardly matching or applicable within the precarious community contexts. If trainings received adhere mechanically to MoH standards, but lack adaptation to local realities, CHWs feel unable to use this knowledge in their daily work. Many official recommendations often requires a certain level of resources (financial, commodities) to be implemented effectively. CHWs reported they felt alone in the translation of standards into practical orientations adapted to the context.

When trainings were offered, CHWs felt they were discouraging, since they adopted methods that are not involving nor empowering them. This view was also shared by nurses and doctors, who acknowledged that training methods are often inefficient. They explained that teaching is hardly based on the learn-act-ask-act cycle, where CHWs can learn new contents and skills, go in the field to test what they learnt, and go back to their tutors to clarify doubts and finally improve their practice with stronger confidence. Additionally, trainings encouraging a model of health and disease based on health education and promotion are missing.

All these conditions create general scepticism around all trainings and activities offered, especially amongst older CHWs. The lack of opportunities to learn and be updated, decreases CHWs' confidence and perception of being good professionals as they feel to ground their practice on outdated evidence even for basic and routine activities, such as vaccines, and leads nurses and doctors to think that CHWs' technical knowledge is

unsatisfactory and frequently outdated. These circumstances negatively impact on their ability even to use tools and equipment already at disposal of CHWs, such as the charts to monitor child development, that are often not fully understood.

CHWs frustrations in relation to training are exacerbated by the fact they acknowledged that training could have an essential role for improving their performance. In their opinion, however, training should be based on active methods and be clearly connected with their daily activities. Content of the training should include updates of old evidence, but also new themes, such as organizational skills. Lastly, CHWs expressed their interest for using tools that could secure their knowledge, guide and orient their daily work. In their views, job aids, similar to the guide introduced for the trial, could be empowering tools.

<u>Support and supervision</u>

The experiences of all informants connected with support and supervision of CHWs were generally referring to their own team work, and their assessments varied across health teams. While all interviewed agreed that team work and mechanisms connected with support and supervision of CHWs were generally weak, experiences of successful supporting mechanisms among health professionals were also reported and highly valued. This contrast was also observed during ethnographic work, where it was possible to distinguish amongst FHTs.

Team work is considered essential for CHWs. Good and cooperative relationships between them and their peers, doctors and nurses, were said to enhance their motivation, knowledge and problem solving capacity. The nurse was identified by all CHWs as the main reference person who can guide in organizing their work, supervise, support and motivate them. The views of CHWs resulted coherent with those of doctors and nurses of the same teams.

Ethnographic work allowed to observe closely these dynamics and, from an external view point, it seemed that the equilibrium between all team members was granted by the recognition that everyone, within the team, could equally contribute to the team and benefit from it. In these teams, the different profiles and competencies of nurses, doctors and CHWs were found to cooperate and bring a wider and more comprehensive vision of their patients and communities. CHWs were considered as key partners in providing complex information about patients and community, that could be translated

by other health professionals in better provision of care and embedded within their biomedical views. Good team work, a clear division of roles and responsibilities, together with strong leadership and coordinating skills of the nurse, were felt to facilitate case management of patients along the continuum from home visits, to case discussion, to the delivery of medical and nursing services within the unit.

Accordingly to these health professionals, frequent meetings amongst team members facilitate problem solving. This was coherent with what observed in the strongest teams. Meetings, or informal and continuous conversations between different health professionals and CHWs, facilitated the organization of work and the definition of priorities. The use of digital forms of communication, such as Whatssapp, was reported, and observed, as an efficient strategy to speed up communications and support links between CHWs and other health professionals.

A latter element that was found strategic in their vision was the educational background and profile of nurses and doctors. When education was specifically oriented to the vision and contents of the family health strategy, and when medical and nursing professionals were working full time with the public health service, as was the case of some of the FHUs involved and observed in the project, the support, monitoring and supervision of CHWs was conducted with greater competence and motivation, and resulted more tailored to their needs.

On the contrary, the lack of appropriate monitoring and supervision of CHWs' activities was identified by informants, and observed during field work, as a major obstacle for CHWs and their performance. CHWs described how poor self-confidence, due to perceived gaps in knowledge and skills, often brings them to seek for information and support within their team; however, they regret that this process is extremely time consuming and frequently not even possible.

Accordingly to CHWs' perceptions, nurse and doctors lack sufficient motivation, incentive and time to duly accomplish their supervisory task. For example, some CHWs reported that some health professionals schedule home visits without considering community and CHWs' requests, or do not discuss cases. Additionally, CHWs felt stressed by hierarchical relationships within their team, which enhanced their sense of inferiority and insecurity and decrease their motivation, self-confidence and performance.

Even in the few positive cases where nurses were perceived to be the "soul" of the team, CHWs complained about their excessive workload, and their consequent lack of time to dedicate to them. The majority of nurses and doctors supported this view and acknowledged that support and supervision within the unit could be hampered by workload, personal characteristics and organizational capabilities of nurses and doctors.

Coordination and management of CHWs is left to the nurse, as acknowledged by all. During field observations, this was particularly evident. As a consequence, nurses often feel alone to carry on with this demanding task. In the area of maternal and child health, this distribution of tasks is even more remarked, as doctors are involved only when mothers or babies present serious health conditions.

Nurses thought that the weak preparation of CHWs even for basic aspects of their performance requires continuous efforts, which decreased the time for more in depth and profitable discussions. An example brought by a nurse was her need to seek information that was lost or not collected by CHWs, but that was required to feed the information system and monthly requests by managers.

Some informants recognized that sometimes team work was hampered by hierarchies and fragile boundaries between roles and responsibilities of each health professional, thus leading to conflict. CHWs acknowledged how these clashes and misunderstandings impacted negatively on them as well. Additionally, as highlighted by some of health professionals interviewed, many doctors and nurses employed in primary health care lacked an appropriate training to perform their task, as they did not receive specific education on primary care, or family health programme, and kept still heavily focused on a biomedical view of health and disease processes. Moreover, doctors and nurses can be employed in more than one heath services. All informants agreed that this situation decreases their sense of affiliation with the service, their motivation to improve team work, and frequently lead to staff turnover, which further exacerbates the situation. During ethnographic work, it was particularly evident how these characteristics impacted negatively on the overall team cooperation, organization and work in one FHT, where health professionals were employed in more institutions, their background was not in PHC, and finally where the hierarchy of roles was strong between the doctor and the nurse, as well as between health professionals and CHWs. In that context, strong attritions amongst health professionals impede the organization of team meetings, dialogue, communication and respect amongst all its members. CHWs were

almost completely left alone in their work, and their willingness to seek help and support almost inexistent.

Both doctors and nurses thought that the current system for supervising CHWs, which assigns this responsibility to health professionals working in FHTs rather than to external professionals, turned out to be inefficient. One doctor described how internal mechanisms for activating quality improvement cycles, and for supervising CHWs' work, are hindered by the fact that CHWs perceived them, and generally the nurse, as lacking the proper authority to enforce their recommendations. This doctor pointed out that nurses are not sufficiently respected as credible leaders, particularly when CHWs worked with the same nurse for long periods, or when they are more senior than her and have been working within the unit and in the community for a longer time. A further disincentive to internal mentoring was reported to be, by the majority of informants, the lack of effective forms of enforcement and control over CHWs' performance. Although ethnographic work could not explore how variations in attitudes and behaviours are connected with time, it was possible to observe that across all teams the nurse was always considered the leader, or the boss. However, it was also possible to remark how CHWs' reactions and responses to her could greatly differ and generally, the more aged were CHWs, the more autonomous and independent they felt.

External technical groups in support of the team are seen by all informants as facilitators for their work. The NASF represents a good example, reported by participants and detected in the field. During ethnographic work, it was possible to observe that the NASF team contributed positively to the organization of educational groups, home visits and other community activities, as well as in the professional development and support to health professionals, especially nurses and CHWs. During those home visits where NASF members worked jointly with CHWs, CHWs were supported on and indirectly trained to improve their triage and risk classification. In one unit, for example, NASF organized a workshop involving mothers belonging to the community, and taught mothers how to build simple toys for the stimulation of their children with budged materials. In this way, CHWs and nurses learnt how to organize and develop a new activity that could be easily replicated.

NASF is highly valued by CHWs and health professionals, and it is considered a trusted source of information and support which gives confidence and motivation for CHWs.

However, although considered strategic, this support was reported as insufficient, as not always available.

3.2.2.2 Leadership and governance

Almost all nurses and doctors complained about the lack of dialogue between managers and health professionals working in the field about of strategies, activities and tools to be used in daily work.

This seemed particularly true for CHWs, who described their relationship with managers as highly hierarchical, not collaborative, nor empowering or motivating. CHWs complained about the lack of dialogue between teams and their management, and of support in terms of education, equipment, infrastructure and problem solving.

CHWs also complained about the amount and the content of the requests coming from District managers, perceived to be excessively bureaucratic, distorting their mission and neglecting contextual needs. CHWs mentioned, for example, requests to collect data of any type and for any kind of scope, including academic studies of which the benefit was obscure, and the mandatory attendance to meetings and events where CHWs voices were not heard and the themes were far from their everyday practice. CHWs complained that quite often these requests were in form of "orders" which were not justified in their rationale and utility, nor followed by any type of feedback.

Ethnographic work provided the opportunity to attend few events where health managers could meet FHTs. During these occasions, it was possible to observe a strong disillusion and detachment not only of CHWs, but also of other health professionals, with regards to health authorities. The events were not properly leading to discussions, but were mostly based on unidirectional complaints to which managers never provided support. It was hardly possible to observe, indeed, a strong engagement towards the criticism from the side of the authorities.

Doctors and nurses reported that District managers did not provide guidance on how to monitor and evaluate the performance of CHWs. An example, described by a doctor, is the lack of methods available at managerial level for penalizing inadequate performances of CHWs. Another complaint, reported by several health professionals, pointed to deficiencies in supporting FHTs for the conduction of comprehensive situation analysis of their communities.

Lastly, all participants pointed out that one of the major constraints for successful action of CHWs is the lack of inter sector public policies to address issues that go beyond health, such as housing, education, sanitation, transport and environment, as well as the lack of support to communities in addressing a variety of issues ultimately impacting on health status. Ethnographic work across all communities where CHWs are involved strongly strengthened this point, since their socio-economic conditions are extremely poor, and highly in need of a strong multisectorial intervention for basic improvements.

3.2.2.3 Service delivery modes

CHWs feel that they are charged with an excessive amount of attributions, which include their routine activities (meetings, home visits, community meetings, reception at the Unit, planning of specialist consultations) and emergency situations, spontaneous requests by patients, support to field visits of external technical groups (NASF), and unexpected and continuous requests from the District. This opinion was also shared by doctors, who recognize that CHWs are overburdened, especially by the managers who tend to expand their bureaucratic tasks without justification and feedback, which decreases their motivation and empowerment.

Some of the requests are described by CHWs as markedly time consuming, not rewarding, or felt as a responsibility, and perceived inappropriate for their context and needs. For example, CHWs are often asked to collect a large amount of quantitative data, such as number of medicines used by each patients, number of vaccines and anthropometric measurers.

According to CHWs, being responsible for a wide range of different health programmes, each one equally important and requiring prioritization, can affect their service delivery. CHWs described how in the last 10 years their program slowly expanded its population targets beyond mothers and children, to include other vulnerable populations, such as people bedridden, suffering from diabetes, hypertension, or mental health, being the latter conditions highly demanding and time consuming.

Under these circumstances, the volume of their patients is felt as excessive. Additionally, as agreed by all team members, the number of families under the responsibility of each team was greater than indicated by standards.

CHWs explained how the consequences of their overload impacted not only on their ability to attend all patients promptly, but also on their relationship with community members, which increased their complaints and dissatisfaction with the work of CHWs.

Lastly, accordingly to nurses and doctors, CHWs' performance could also be affected by an inadequately organized flow of patients and activities within the Units. CHWs also complained that they are often required to take care of tasks beyond their competencies and responsibility. In one case, indeed, it was observed that the management of the pharmacy within one unit was left to CHWs due to a lack of dedicated human resource, a task that falls well beyond their responsibility.

3.2.2.4 Other health system factors

All team members acknowledged that health services often performed poorly in relation to population needs and expectations. As a consequence, patients often mistrust the overall network of care, with consequences for all health professionals, especially CHWs, which are their first contact. Accordingly to their experience, the health system network is poorly responsive and synchronized across health facilities and feedback is missing. During ethnographic work, it was possible to assist very frequently to patients' complaints on delays with health system response, in booking exams and visits and receiving feedback. CHWs daily faced these situations, and were treated as guilty by their peers as lack of health system response was a CHWs' fault. It was possible to observe the stress, shame and suffering provoked in CHWs by these continuous remarks.

Doctors and nurses described how often the information of a patient attended across different centres gets lost and its record gets missed or broken. However, the responsibility for this ultimately falls under the primary care system and the CHWs, who feel responsible for failing to provide adequate attention for their community. Health system deficiencies decrease the confidence of patients into the overall health care network, and impact not only on their willingness to adhere to therapeutic plans, but also, on the credit they attribute to CHWs.

3.2.2.5 Infrastructure and equipment

Accordingly to all respondents, poor infrastructure, equipment and lack of drugs and commodities within the unit affect the possibility of delivering some services, or guarantee their quality.

CHWs complained that essential medicines that should be available within the unit are often lacking, a situation that was also observed during field work. Accordingly to them, periodic shortages negatively impact on patients' motivation to seek and adhere to their advice. This mechanism is further emphasized by the poor economic conditions of community members, who cannot supply by themselves to the health system gaps.

All team members recognized that the frequent lack of space assigned to CHWs for the storage of their material, or for organizing educational groups, decreased their motivation and ability to perform promotional activities. Difficulties with the set up of health groups were also observed during ethnographic work. Although the organization of promotional activities was not impossible when FHUs were lacking appropriate spaces, events had to be set in public spaces outside of FHUs; the increase of logistic difficulties and arrangements negatively affected CHWs motivation to organize them.

In line with these observations, CHWs expressed their discouragement for not being provided with adequate equipment to undertake or facilitate their work and reported that, when possible, they tried to supply this gap with their own resources. These were the cases reported for umbrellas, sun screen, or, within the intervention group, for books that were specifically brought for ECD promotion.

Lastly, all participants agreed that health units are often not accessible under heavy rains, as it was frequently observed during the set up of the ethnographic work, while others cannot provide a healthy environment, or guarantee enough space to ensure privacy during consultations, which increases patients complaints and unwillingness to attend services.

3.2.2.6 Information system

Accordingly to doctors and nurses, the information system newly introduced, the ESUS, was not efficient compared to the previously used SIAB, for various reasons. This perception was unanimously supported by all CHWs. All informants reported that the format of the tools used by CHWs to collect and register data, and the amount and type of the information requested by the system, are inappropriate for field work in their contexts.

Everyone agreed that the number of forms to fill was excessive, and could impede CHWs to focus on other activities more oriented to the delivery of service. In their opinion, data forms only include boxes that should be crossed, or filled with numbers, while omitting qualitative aspects of the visit. All team members concurred in saying that the information system is not supporting CHWs in recording useful information that would benefit their work.

CHWs described their difficulties to follow up their patients and monitoring the therapeutic plan and history of each case under this new system. In the case of children, for example, CHWs complained the lack of sufficient copies of the *'cartao da criança'* (child health booklet) for monitoring the individual situation of each child, which was previously available under the name of *cartao espelho*.

At the same time, nurses and doctors noticed how this new system negatively impacted on team work and the ability of CHWs to inform efficiently team discussions and referral of problems. CHWs reporting became less structured, with observations were less based on data. Nurses and doctors said they felt lost with the new system.

As reported by one nurse, the system is not planned, for example, to visualize the therapeutic history and follow up of patients, including type and dates of visited received, nor a comprehensive view of key health determinants, which was possible with the former information system (SIAB).

Problems were also found in the data entry process, which is not perceived by the majority of CHWs as a straightforward activity, and frequently made difficult by the inability of some of them to use a computer, the lack of sufficient training on how to feed the system, or the insufficient number, when they are available, of computers.

Doctors and nurses also argued that data collection tools and strategies are imposed vertically by managers who lack field experience. On the contrary, health professionals involved with field activities, who know local realities and could provide valuable suggestions for the contextualization and adaptation of these forms and methods, were not involved in their development. Additionally, team members reported that this process, its changes and difficulties, were not supported nor explained by managers.

A few of them observed that data collection and data entry by CHWs was weak due to lack of understanding of what they were doing. As a consequence, data collection tends to be incomplete, which hinders the reliability of the information retrieved and forces nurses to dedicate time to fill these gaps. In their views, this is further exacerbated by the fact that communities are alive bodies, therefore the situation at one point in time might not be reflecting the reality even after a short time. Also, there are some areas that are really hard to get monitored and reached, such as precarious shelters on the river.

3.2.2.7 Financing

All informants expressed their criticism about the PMAC, the national programme aimed at monitoring and improving the quality of the performance at PHC level and release of financial incentives to the FHUs, and unanimously described its consequences on CHWs' performance as negative.

Doctors and nurse expressed their concerns over the indicators and targets selected by managers for monitoring and evaluating CHWs' performance. In their views, productivity is merely judged by the achievement of a certain amount of activities and services, while quality of their performance was neglected. This system places CHWs in front of a dilemma: producing numbers or producing a service of quality?

These observations were corroborated by CHWs and field observations. Ethnographic work with CHWs allowed to capture their obsession for reaching the quantitative targets, especially the count of home visits, which turned to be a leading motivating principle for the planning of their work. CHWs explained how their organization became increasingly focused on the achievement of monthly targets and linked to financial incentives. Targets become a priority and the a primary criteria for prioritizing their activities.

CHWs complained that these targets are based only on quantities, such as number of home visits, or number of vaccines delivered. They feel forced to invest energies for producing numbers, which are visible to their managers, rather than focusing on "invisible" activities, such as dialogue with mothers or the organization of educational groups. The system is seen as pushing CHWs to prioritize activities that produce numbers, and decrease their motivation in improving the content and the quality of their work. During field observations, it was quite evident that the rush provoked by the willingness to reach a high number of home visits in a short period, decreased the time dedicated to each patient.

Lastly, CHWs highlighted that sometimes the targets are not reached for reasons quite often beyond their control, and complained about the lack of opportunities to provide explanations for these failures to their managers.

3.2.3 Community system

The understanding of scope and limits of public health system by community members, their views about health and disease, the social recognition and trust they grant to CHWs, the existence of social networks, the attitudes to problem solving and the socio-economic conditions of the contexts were all described by health professionals as inputs from the side of the community system that influence CHWs' performance.

3.2.3.1 Understanding of scope and limits of public health system, views about health and disease and social recognition of CHWs

Accordingly to all informants, the majority of community members tend to have a poor and narrow understanding of health services and the mechanisms behind the work organization, and prioritization, of CHWs, nurses and doctors and of health services provided within and outside the FHU.

When people see health professionals walking in their communities and feel that their requests to be attended get neglected, they often express their frustration to CHWs, who are considered responsible for not considering them as a priority. CHWs' schedule for home visits is frequently changed because the visit to a patient and household requires a longer time to respond to requests of other family members or neighbours. In CHWs' experiences, it is quite common that community members transfer on them their

frustration for poor performances of the public health system network. These events, such as delays and complains, were frequently observed during field work with CHWs.

Informants said that many community members perceive the health unit merely as a place where they can receive treatments or exams, and where they can be referred to a health specialist, but have no interest for health promotion and education. Although the community perspective only indirectly explored with ethnographic work, it often happened that patients clearly declared their indifference for health groups and reluctance to attend. This attitude increases the difficulty to have people attending the activities oriented to health promotion and prevention. CHWs and other health professionals remarked that people tend to access the FHUs only in case of emergency and conceive these places as only devoted to treatment.

Accordingly to doctors and nurses, the role of CHWs within the community is often misinterpreted. Some patients see in CHWs a bureaucrat and not a health professional, since they are continuously asking for data and information, filling in forms and booking consultations and exams. In addition, CHWs acknowledged that their credibility is often questioned, and their orientations, services and initiatives are not always welcomed, nor recognized, with negative consequences for their own motivation. Cases were described when patients identified their lack of knowledge in relation to specific technical issues, with a consequent increase of patients' scepticism for their role. This dynamic was observed in few cases during field work. The immunization schedule for children is continuously changing, and while promotional campaigns delivered by radio or television provided sufficient information to community members on vaccines for their babies, in the events assisted, CHWs were not yet updated, therefore unable to properly respond to their patients' requests and got frustrated by their gaps of knowledge.

In other instances, all informants complained that population requests are far beyond their technical knowledge and possibilities of CHWs, or CHWS may lack the ability of adapting their knowledge to contextual needs. Some of their orientations may just not be feasible in certain circumstances. The overall consequence of all these mechanisms, accordingly to participants, is the loss of CHWs' credibility vis-à-vis the community and, at the same time, of CHWs self-confidence and motivation. CHWs end with feeling powerless and frustrated, which reflects into their ability to work effectively. For doctors and nurses, community members often abuse of CHWs' availability and role. Some patients, indeed, entrust completely their health and health needs to CHWs, which

contributes to place a heavier and more demanding burden of responsibility to this professional.

Another obstacle identified by all team members is that patents are often resistant to accept CHWs' services, or simply to comply with their advice. Community members, in their views, may trust more themselves, their friends and relatives than CHWs. Informants connected the disadvantaged socio-economic and educational conditions of their communities with difficulties in the understanding and recognition of the health care needs and problems of themselves, as well as for those under their responsibility, as in the case of children. Pregnancy was brought as an example by CHWs on how some of their patients may seen in it a way to receive financial benefits from the public sector and not a condition which requires attention to health status.

All professionals described how patients, including mothers, can be highly resistant to behavioural change, and although not deeply investigated, this aspect was quite clearly captured during ethnographic field work. For example, adherence to treatment, for example measured by counting patients' medicines by CHWs, was far from being respected.. The translation of CHWs advices into attitude and practices of patients is seen by CHWs as a very slow process based on endless little steps (*trabalho de formiguinha*, or ants' work). This dynamic is exacerbated by lack of self-confidence of CHWs, which, accordingly to CHWs themselves, is easily perceived by their patients.

Despite all these challenges, most CHWs assessed their role as socially valued and recognized by their populations. During ethnographic observations, the overall perception of CHWs' status across the community was positive. Sometimes, as reported by CHWs, community members look for CHWs before any other type of professional, or may be willing to disclose their personal problems and sensitive information only to them. In their views, this might be facilitated by the close relationship between them and their patients, who feel the lack of physical and emotional boundaries. This connection, which CHWs recognized to be often very personal, may also facilitate the flexibility of CHWs work organization and service delivery. For CHWs, informal talks with patients are a valuable source of information for conducting a situational analysis, as they can help to get solidly grounded into the community environment and understand changing dynamics across their communities.

Accordingly to CHWs' opinions, the linkage between them and the community receive a reinforcement, especially across resistant groups, when, for example, these patients receive a joint home visit of CHWs and other health professionals (nurse, doctor or NASF member). For CHWs, these events let their patients to feel privileged, which later positively reflects in the confidence shown for CHWs.

3.2.3.2. Social networks, attitudes to problem solving and socio-economic conditions

All professionals acknowledged what was also observed during field work, namely that socio-economic conditions of communities are very precarious, since they are characterized by poverty, widespread lack of basic sanitation and hygiene, lack of spaces for leisure and play, physical and moral violence, use of drugs and alcohol, as well as existence of numerous vulnerable groups, such as adolescent mothers, or people suffering from serious disease and disability.

Another element evidenced during informants' discussions is that these communities are also rapidly changing. Modifications in population composition and family structures are constant, which require CHWs to dedicate time not only to update registers with new data, but also to identify new priorities across their community and within each household. New residents bring new risks and health needs and, from the heath professional perspective, these rapid changes jeopardize the continuity of care for single patients, as well as of community initiatives. CHWs often reported the example of pregnant women, who frequently change their residence during the gestational period, with a consequent loss of ties with their CHWs and the overall health services.

Additionally, informants highlighted how some members of the community are not able to adhere to treatments or change health behaviours for lack of financial resources. For example, CHWs reported that there were several cases of patients that could not afford the cost of public transports to reach health services, and so had to interrupt their therapeutic plan. During ethnographic visits to families, for example, in different occasions mothers reported problems with access to health services for reasons connected with the imprisonment of their partners, which decreased their freedom, or logistic support or simply for the time spent to visit them in jail.

Attempts to reach some community members and families were described as a very difficult, time consuming and not always successful task. It happened frequently that

access to services was impeded as a consequence of violence, or patients have problems to reach FHUs, or CHWs themselves experienced difficulties to make home visits for various risks. In these cases, CHWs try to seek the support of a mediator, such as a neighbour or another family member, although the success of this strategy was often far from being guaranteed.

Another problem faced by CHWs is represented by ethical dilemmas or situations which place them in a difficult position. For example, CHWs described their uneasiness in front of adolescent girls who are victims of violence by their partners, and about the opportunity to inform mothers of adolescents girls, or also in front of the need to provide care to drug dealers or to violent people. Concerns for personal security was reported by CHWs as a factor that could impede them to deliver their services and access some areas of their community. This was also experienced during ethnographic visits, impeding to access many sites for the potential risk connected.

Lastly, community requests and needs may frequently go well beyond health issues and rather be connected with socioeconomic problems, poverty and isolation. Although those issues are not accounted for CHWs' targets requirements, it is impossible, as unanimously argued by CHWs, to refrain from attempting to provide some supporting, especially if people in need are neighbours or friends. This situation was also confirmed in few occasions during ethnographic visits. In one case, for example, a CHW spent part of his time by attempting to find a viable solution for avoiding the rain from pouring into a very precarious house that hosted a young pregnant woman with her 1-year old child. After different attempts, the CHW brought with his own resources some plastic material to reinforce the roof.

4. Discussion

We will first assess whether and to which extent the findings from the case-study are in line with those of the literature review and consequently validate the logic model proposed in the first part of this research (Chapter I). Then, we will proceed to discuss critically the success and failure, and their factors and mechanisms, of the intervention trial aimed at improving the quality and effectiveness of HVs carried out by CHWs to pregnant women and mothers.

4.1. Factors influencing CHWs' performance: how the findings from the case study compare with those of the literature review

The findings of the case study are largely overlapping with respect to factors and mechanisms of effect that were found to impact on CHWs' performance

4.1.1 Formal health system inputs

Findings related to human resources confirm those obtained through the literature review and added new details, which further strengthen and clarify the evidence around a few factors and their role in shaping CHW's performance.

Findings were consistent between the case study and the review in relation to the contradictory nature of residency on CHWs' performance, and the negative influence of CHWs' contractual terms, including low salary and absence of a career plan, which badly affect CHWs' attitudes. Consistency was also confirmed with respect to the limitations of initial training and CPD, whose lack or inappropriateness negatively influence CHWs' performance by worsening their knowledge, attitudes and practice. Evidence form the case-study upholds that support and supervision are powerful inputs for CHWs' performance, influencing either positively or negatively depending on contextual factors regarding the composition and functioning of team work, such as competencies, practices and attitudes of nurses and doctors and the opportunities to express their potential. Similarly, the case-study confirmed that poor leadership has negative implications not only for the organization and work of individual CHWs, who could feel, for example, overburdened with inappropriate tasks, but also for the guidance and planning of wider communitarian actions, such as inter sector activities. Consistency was also found with respect to the negative consequences suffered by CHWs due to community reactions on gaps and delays in the responsiveness of the overall health system network to patients' needs. An additional point of connections between the case-study and the review was the perception that financial incentives are strongly focused on the quantity of activities and vertically imposed, which ends up with distorting CHWs' mission.

A few aspects emerged in the case-study that could add to, complement or even strengthen the review findings. First, the case study showed that hierarchical relationships, not only between health professionals and CHWs, but also across health

professionals themselves, especially between nurses and doctors, represented negative factors impacting on the quality of support and supervision to CHWs. Second, the case study highlighted that when nurses, and even more frequently doctors, had more than just one employment, their time and commitment for the work within the FHU was reduced, with negative consequences for team work and CHWs' performance. Third, the reports collected by the case-study further emphasized the importance of the support provided by external technical groups, such as the NASF, and their positive potential for improving CHWs' performance.

The specific case of the information system is worthy a more articulated discussion. During the period of the case-study, the information system used by FHTs changed from the SIAB to the ESUS. Interestingly enough, but maybe not surprisingly, the difficulties and negative implications reported in the review with the use of the SIAB are very similar with those in the case-study about the new system, which was considered worse-performing than the previous one. Problems were reported in relation to its user-friendliness, appropriateness, relevance and use of data. For being that new, comparisons are difficult, and the study on how the ESUS performs in the field would deserve a separate research. However, these observations lead to think that the new system was not developed considering the implementation deficiencies encountered by CHWs and other health professionals with the previous one. Ultimately, this example questions the way health professionals in charge of collecting data, mainly CHWs, are (not) involved in the development of essential tools that they are supposed to use.

4.1.2 Community system inputs

The case-study confirmed all the findings of the literature review in relation to the community system inputs that impact on CHWs' performance. Similarly with the review, the case-study emphasized how community members' views about health and health services, their recognition of the role of CHWs, and other factors inherent the communities such as the socio-economic context, social networks and cohesion, all considerably impact on CHWs' performance. The case-study, particularly, showed how CHWs could feel powerless in front of the hardships of the socio-economic context, and vice versa how, if supported by successful experiences in their communities, they feel confident and proud for being able to use existent windows of opportunity to revert

some negative mechanisms caused by a poor understanding, acceptance and use of the health system, and to contribute to promote collective problem-solving efforts.

4.1.3 The use of the logic model for impact evaluation

The substantial overlap between the case-study and the literature review about the main factors and causal pathways that shape CHWs' performance lead to suppose that the logic model presented in Chapter I is sound, and can be adopted to describe and understand local implementations of CHW program within a system thinking perspective.

The logic model could serve as a tool for assessing and improving CHWs' performance, not only at the macro-levels of CHW national program, such as Federal and State levels, but also at the micro-level of health districts. Having a clear picture of what may represent a barrier or a facilitator of CHWs' performance, the model can facilitate the development and evaluation of policies and actions aimed at strengthening CHWs' program implementation.

4.2. Process evaluation of the case-study

Once justified the application of the logic model developed in Chapter I to local contexts, we can more confidently move to use it for framing the discussion on successes and failures of the intervention trial.

As reported in the background section of this chapter, despite the implementation of the trial matched its protocol, and important results were achieved in relation to sustained improvements in CHWs knowledge, the impact on mothers' health practices was much less evident.

The experiences and views collected across all participants involved in the intervention provided valid material for attempting to assess the overall study design of the trial, uncover causal mechanisms that led to the observed impact, interpret the results obtained, and finally identify potential outcomes that were not captured by the project, as may have fallen beyond what observed with numbers.

4.2.1. Logic model of the intervention *versus* the logic model of CHWs' performance

The first consideration emerging from this analysis was that, while designing the trial, the research team paid insufficient attention to the complex causal chain between the delivery of the intervention and its outcomes.

Based on the description of the project provided in Box 1, and the model developed in Chapter I, the implicit logic model behind the quality improvement intervention of the trial could be displayed as in Figure 7.

Figure 7 Logic model of the case-study quality improvement intervention
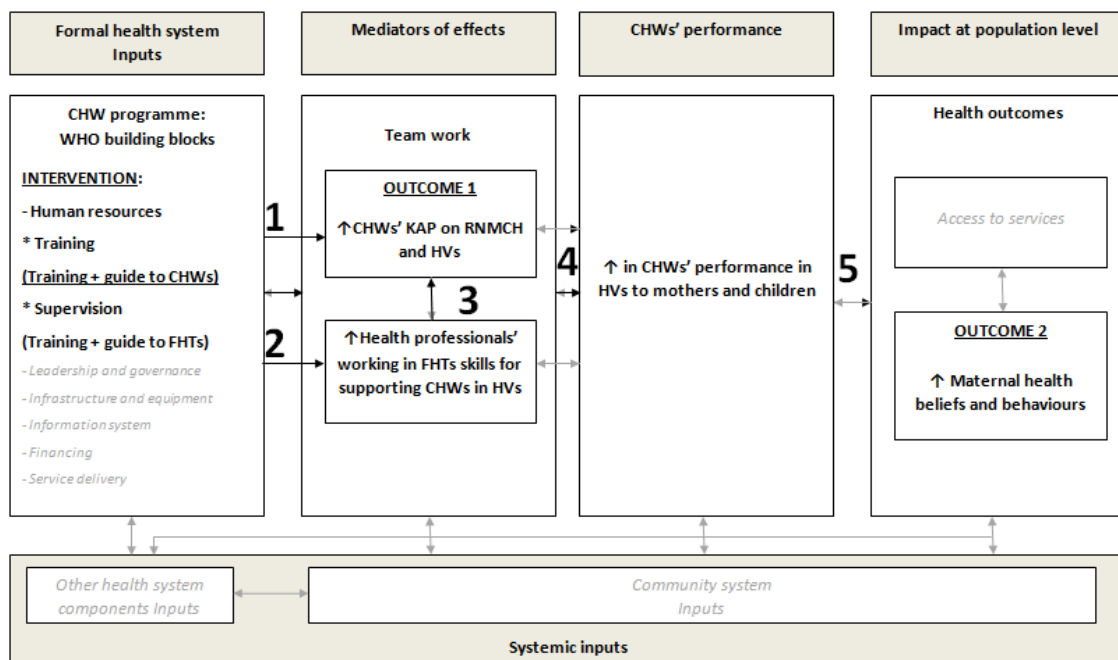
In Figure 7, black characters and arrows display the inputs and pathways of change assumed by the implicit logic model of the case-study, while gray text and arrows reported those that were included under the model developed in Chapter I. The intervention is seen as an input to the overall quality improvement process and it is aimed at strengthening a component of the formal health system, namely human resources, and, within human resources, only training and supervision. The outcomes measured in the trial for assessing the effectiveness of the intervention are displayed in the second and last columns, and they represent respectively self-reported CHWs' KAP (outcome 1) and self-reported maternal health beliefs and behaviours (outcome 2).

The logic assumptions that were supposed to lead from the inputs to the expected outcomes are displayed in the model with numbers from 1 to 5. The first assumed that the delivery of a training and a guide to CHWs on how to deliver home visits to mothers and children will improve their knowledge, attitudes and practices. The second assumed that the delivery of a training and a guide to health professionals working in FHTs with CHWs (doctors and nurses) will improve their skills in supporting CHWs to use new knowledge and adopt new practices. The third assumed that these new skills of health professionals will concretely improve the support received by CHWs. The fourth assumed that the improvement of CHWs' knowledge, attitudes and practices, supported by FHT members, will improve the quality of CHWs' performance in delivering home visits to mothers and children. The last, and the fifth, assumed that the improvement of CHWs' performance in delivering HVs to mothers and children will improve maternal health related practices.

A visual comparison of the trial logic model with the model generated by the review and confirmed by the case-study, helped to identify key factors that may have hampered the causal pathways hypothesized by the intervention logic assumptions, therefore the impact of the trial on CHWs' performance and, ultimately, on CHWs' effectiveness in modifying mothers' behaviours.

4.2.1.1 CHWs' KAP

The first assumption behind the logic of the trial was that the delivery of a training and a guide to CHWs will have improved their knowledge, attitudes and practices on how to deliver home visits to mothers and children. Although this assumption may be considered as confirmed by the trial results , the linearity of this causal connection can at least marginally be questioned.

The training, more than the guide, were seen as positive inputs by all respondents. The effect of the training on CHWs' knowledge was indeed confirmed by the results regarding the first primary outcome of the trial, i.e. CHWs' KAP. Also, the availability of the action-oriented guide may have facilitated the stability of the improvements at one-year follow-up, although this was not applicable to all CHWs. Lastly, knowledge, attitudes and practices could have been reinforced by the improved ability of some CHWs to clarify their doubts with their FHTs by reporting problems more appropriately.

Training methods and contents contributed in several ways. They transferred effectively new knowledge, they gained CHWs' trust and therefore overcame previous scepticisms on educational opportunities. They also reinforced CHWs' motivation, interest, self-perception and self-confidence. These attitudes seemed to have also been boosted indirectly, by some virtuous mechanisms facilitated by the intervention between CHWs and their team members and communities. Lastly, CHWs' practice, as reported by them, seemed to have improved, at least for a portion of the group.

However, the comparison of the trial logic with the findings of Chapter I and the case-study highlighted some deficiencies in the project design and, consequently, in its intervention. Findings from the literature review acknowledge that many inputs challenge daily CHWs' motivation and interest for their work and its improvement. The daily routine of all CHWs is much more complex and wider than the focus of the project, and factors well beyond the trial may have affected the ability and the willingness of CHWs to translate the training and guide contents in field work. Qualitative insights from both the review and the case-study acknowledged the difficulties of CHWs to organize their work and deliver services according to standards. Furthermore, the availability of a guide may not be a sufficient input by itself, since it appeared that not all CHWs were able to use it without further support. There is a great variation across CHWs educational level, experience, knowledge and skills that should be considered when developing working supports for CHWs. Thus the training and the availability of the guide to CHWs, doctors and nurses alone cannot be sufficient to improve CHWs' practice. Despite the lack of reliable quantitative evidence to inform this statement, consistent reports from participants allow to be confident in it.

To improve the impact of the training and guide, some informants suggested the introduction of supportive supervision sessions in the field, conducted by external technical groups, to guide CHWs in the translation of new knowledge into practice and to clear out doubts. This strategy would be probably welcomed by CHWs, accordingly to their positive perceptions in relation to external support. Additionally, and in line with findings of both the review and the case-study, there is plenty of evidence that all job aids should be developed together with CHWs to improve understanding and adaptability to the context.

4.2.1.2 CHWs', FHTs and team work

The second and third assumptions behind the logic of the trial expected that the delivery of a training and a guide to doctors and nurses working in FHTs with CHWs would have improved the skills and the availability of health professionals to support CHWs in the use of the new acquired knowledge. These assumptions were mostly, but not totally, correct.

All participants, and not only CHWs, acknowledged as crucial the engagement of all health professionals in the project. The importance of the relationship between CHWs and other FHTs' members have been recognized in both the literature review and the case-study. A clear vision and understanding of what was learnt by CHWs, and seems to have improved the ability of interested health professional to help CHWs in solving their problems and reinforce their knowledge; additionally, it seems to have facilitated their tutoring tasks, as reported in the case of the nurse who grounded case discussions with their CHWs based on the content of the guide.

These positive synergies were also found to be beneficial for the relationship between CHWs and their patients, and ultimately for mothers. Although these observations are only based on the point of view and experiences of CHWs and health professionals, the reiteration of similar orientations and counselling to the same patient by different team members was described by health professionals as reinforcing messages to patients and therefore, potentially, their effectiveness on behaviour change. These successful experiences, however, were not shared across all FHTs. Case-study and review findings described how team work can be hampered by health professionals attitudes, skills and knowledge, as well as external challenges connected with the formal health system. Lack of human resources and time for providing support, strong hierarchies, inability and unwillingness for tutoring CHWs are among the factors that can decrease the benefits and potential of an improved definition of CHWs' role and tasks within a multi-professional team.

Within the case studied, two other elements linked with FHTs' support emerged as possible obstacles. The first was the lack of motivation to sustain this project due to the scepticism about its contents by some health professionals, as in the case of a doctor

who discredited ECD practices. The other dynamic that might have weaken the expected effect of improved team support was the reliance only on existing internal mechanisms of support and supervision, without accounting for their pre-existing reported deficiencies.

The study design did not include any indicator to measure the effectiveness of team support, nor planned any additional input, such as for example periodical reinforcement meetings with the teams, to ensure it.

4.2.1.3 CHWs' performance

A further assumption of the trial was that all the inputs received by CHWs and their team members could be translated into their field work. Although the project did not include any outcome measure to assess directly this improvement, due to logistical difficulties in ensuring the direct observation of a sufficient number of CHWs in a sufficiently representative sample of situations corresponding to the specific tasks promoted by the training and guide, we know from our qualitative review and case-study how difficult this might have been, for all the obstacles encountered by CHWs to carry out appropriately their work.

As extensively described in our research, CHWs' performance is influenced by a wide range of factors and complex underlying dynamics. The intervention delivered within this project provided inputs to strengthen only one of these factors, namely human resources. The fourth causal link of the trial logic was weakly supported by the intervention design.

While case-study findings indicated that despite the ability of CHWs to observe, provide advice to mothers, and use the risk classification to guide action was acknowledged by the majority of informants, even the more enthusiastic participant to the trial recognized that none of them was able to perform adequately home visits, even if supported by improved knowledge, motivation and willingness to do their best. Their performance was hampered by a variety of other reasons, the first being related to the fact that home visits to mothers and children was only a relatively minor component of their daily work, and consequently could not be given enough priority.

4.2.1.4 CHWs and the community

The fifth and last assumption behind the project held that improvements of CHWs' performance could be reflected and observed in maternal practices and behaviours, and that this step could be measured through mothers' KAP (Outcome 2). This assumption took for granted that all mothers would have received a sufficient number of visits, and that they would have been able to understand the advice received and comply with it. However, all these causal pathways are challenged by the cultural and socio-economic context, both at community and individual household level. It is therefore not surprising that most mothers' practices did not significantly improve, although data on maternal knowledge and behaviours showed some positive trends on specific items, notably those related to ECD practices, which may have suffered from an insufficient sample size and therefore not been able to reach statistical significance.

The majority of CHWs concurred in recognizing that their ability to provide and back up their advice with reference to scientific knowledge and standards improved and allowed them to gain more trust and recognition from their patients. Additionally, for those who used the guide during field work, its display as an official job-aid increased their credibility during home visits. Also, it was strong among them the feeling that their counselling, particularly on ECD, strengthened their ties with the mothers. The "emotional" nature of the ECD message, and the ability of mothers to easily translate what learnt in practice with no additional economic resources, was said to be beneficial and activate a positive cycle of trust and reward. Furthermore, mothers' confidence in CHWs was further improved by the coherence of CHWs' advices with those provided by other health professionals belonging to FHTs.

To explain the weak impact of the trial intervention we can refer to the rich literature findings of Chapter I which described, quite consistently across all Brazilian experiences, how the effectiveness of CHW work can be hampered by the weakness of knowledge, attitudes and expectations of individuals and communities in relation to their health as well as, in some instances, by poor recognition and trust in CHWs. Social networks and family ties may also interfere with beliefs and norms, as well as the overall social conditions. For example, it happened frequently that CHWs' counselling was conflicting with that of close family members, such as grandmothers or friends.

4.3 Implications of the case-study findings

The relevance of this research lies in the still debated role of CHWs, both globally and within the Brazilian health system, and the need to learn about ways to improve their performance.

Observing CHWs' performance in their daily practice, and investigating the mechanisms underlying the results that were achieved, and those not reached, by an intervention trial specifically targeting CHWs, could produced a series of benefits.

First, all stakeholders directly involved in the project, including the research team, CHWs, nurses and doctors, could get a picture of what happened in the field as a consequence of the intervention, including what changed and what remained unchanged, what facilitated changes and what were the barriers, what worked and what did not, and why it worked or why did not.

Second, the understanding of the process components, those planned and those *de facto* occurring, is a learning experience which is necessary to improve the design of future studies and their implementation, and could be used by the same research team, as well as by other actors, and particularly by health authorities, who may be interested in foster change in this specific component of the health system at community level.

At the same time, the benefits of this research might expand to more distal stakeholders involved with CHWs performance in Brazil. An analysis of factors and dynamics that shape CHWs practice could enrich the debate about effective ways to improve CHWs' performance.

Also, this case-study promotes and shows how to undertake a process evaluation of quality improvement interventions with a system thinking approach and could serve as a useful example for future evaluations.

4.3.1 Research design

Overall, the design of the project can be considered fragile if compared to the complexity displayed under the logic model of the factors involved in determining CHWs' performance. This might be due to the lack of a comprehensive formative evaluation during the development of the project design. This may have led the

research team to simplify and underestimate all the causal connections between their intervention and the expected outcomes.

The intervention which was designed was a too partial and weak input to be able to overcome most of the systemic barriers connected with the work of CHWs. Lastly, although the contextual difficulties to implement more complex research designs in the communities involved in the project should be acknowledged, the selection of the outcomes to assess its effectiveness was on one side too limited (no direct observation of CHWs' performance could be planned) from one side, and excessively ambitious on the other (more sensitive end points related to mothers' knowledge) could have been identified).

The quite positive results related to CHWs' knowledge were achieved because they were depending from the first of the five key assumptions underlying the trial, related to the training efficacy in achieving sustained improvement of CHWs' knowledge and the least difficult to be satisfied in the given context. Conversely, the outcomes related to pregnant women's and mothers' knowledge and practice were depending on the optimal functioning of all the other four causal links, and therefore much more likely to be missed. These causal links were interfered by all kind of systemic barriers to CHWs' performance and by obstacles inherent to the recipients of the interventions. First, CHWs practice not always improved, or not for all CHWs. Second, team support was not always granted, or was provided inappropriately or inefficiently. Third, CHWs' field work typically encountered a variety of obstacles. Fourth, pregnant women and mothers were, unsurprisingly, strongly influenced by their own social background.

4.4 Strengths and limitations

This study had several limitations, which were due to the scarcity of human and financial resources and to the logistic constraints encountered during the planning and development of our work, which had a major impact on its design and methods.

The case-study approach was chosen as the most fitted research method for this purpose, since it allowed for an holistic and in depth investigation and evaluation of a quality improvement trial, which is a complex social phenomenon set in a bounded and real life context (Creswell, 2013). Despite its potential for the purpose, this method of

inquiry and its products, including those related to this research, are not exempted from limitations. Their reliability, validity and generalizability are often criticized and these limitations could also be acknowledged as at least partially applicable to this research (Hamel 1993; Flyvbjerg 2006).

Being highly based on context and individual cases, as it happened for our research, the potential of the case-study approach to expand findings from the particular to the general, and to produce new theoretical and context-independent knowledge that could be transferred to other situations, is often questioned (Flyvbjerg, 2006). Additionally, case-studies are considered more suitable for generating hypotheses in the early stages of a research project, rather than for building theories or test hypotheses at the end of them, as was the case in this project (Flyvbjerg, 2006). Moreover, case-studies are criticized for the strong reliance on the personal sensitivity and integrity of the investigator in limiting bias towards the use of data merely to verify and confirm the researcher's preconceived ideas; a limitation that was further challenged in this project by the involvement of only one researcher (Guba and Lincoln 1981; Flyvbjerg, 2006).

Although many arrangements were adopted, as described in the methods section, to secure internal and external validity to this project and overcome criticisms, a few weaknesses should be acknowledged.

Trustworthiness and internal validity of the research were strengthened by triangulating evidence from different participants, selected to allow maximum variation across the sample, through the adoption of multiple data collection techniques, including firsthand observations, through the validation of findings by all informants and a reflexivity exercise of the researcher (Lincoln, 1985). However, limitations to this approach can be found at many levels. The selection of the sample was limited to CHWs, nurses and doctors, while could have been expanded to include the views of other stakeholders, especially health authorities and community members. While the former actors could have provided a different and enriching perspective on systemic inputs, specifically related to the formal health system, the latter could have deepened the understanding of the community system and its interactions with CHWs and health services. This case-study adopted an health system perspective, but this could be considered partial for not having involved health authorities. Most important, the community perspective was completely absent, and only reported as through the experience of informants. This gap weakens the findings related to factors and dynamics that connect CHWs and their

patients, as well as individuals and health services. Community members are an integral part of the health system, as recipients and individuals who experience care on themselves (Tuncal et al., 2015). They represent a strategic component within the "people-centred" framework of the health system used internationally (Gilson, 2012), in primary health care settings, and in the specific context of CHWs program in Brazil, and therefore their role should have deserved attention. As acknowledged in the methods section, many attempts to engage mothers as well as health managers in focus groups discussions and interviews were undertaken, although unsuccessfully. Health managers were often busy, while mothers were not prone to accept the invitation, or to participate in focus groups, and the few sessions organized were unproductive and poorly attended. These failures were difficult to overcome due to logistic constraints connected with the lack of time and the availability of human resources.

The selection of data collection methods was justified by the purpose of the inquiries and the type of participants involved in discussions, as explained in the methods section. Focus groups were thought to be the best approach for CHWs. Saturation of themes, the depth of analysis achieved and the freedom shown by participants across all discussions suggested that additional strategies for collecting data would have been redundant. However, it would have been interesting to add some sessions where all type of informants (CHWs, nurses and doctors) could have joint discussions and share their views.

Ethnographic work could have definitely been longer and could have been extended to all units and teams involved in the project. Major limitations were connected with the lack of time and funds to extend observations. These gaps negatively reflected on the saturation of themes observed, which was not reached within the time given. Observation of certain systemic inputs, such as the interplay with leadership, the information and financial systems, was lacking, while other elements, such as the dynamics with community members were investigated only partially and adopting CHWs' perspective.

Additionally, although the researcher conducted a reflexive exercise and explicitly declared her position with regard to the research issue, the performing of all data collection activities by only one researcher, which was due to limited financial resources, might have biased the selection of data and their interpretation, as well as impacted on the quality and completeness of data collected.

The availability of the researcher to conduct field work for this process evaluation was only posterior to the delivery of the intervention. For this reason, all data collection sessions with the intervention group were only held after it. Although this gap was mitigated by the study of a similar group of participants (control group), this aspect is considered a limitation, as it was not possible to plan multiple data collection points along the study period to capture dynamics and changes within the intervention group from before the trial to its immediate afterwards.

The method used to analyze, systematize and visualize the information collected for the case-study, we believe that was firmly grounded in the logic model for CHWs' performance specifically tailored to the Brazilian CHW programme, and based on the findings of the literature review. The use of an evidence-based theoretical framework increased the power of external validity of this case-study and the thorough description of events provided across the result section allowed the reader to extrapolate context-independent information from a study that was set on a specifically bounded reality. The generalizability of the findings and of the method of case-study seems satisfactory, since the results can be extended by using the proposed analytical model used to the national panorama.

Chapter III. - Policy options to improve CHWs' performance

1. Background and objectives

In the first part of the research, based on a review of qualitative studies on CHWs in Brazil, we developed a logic model showing how the factors related to the formal health system components - those inherently linked with CHW program and those depending on overall system functioning - and the social and community contextual factors interact to impact on CHWs' performance.

In the second part, we assessed to which extent the information gathered through a qualitative insight into the factors influencing the outcome of an intervention trial aimed at improving CHWs' performance on home visits to pregnant women and mothers could fit into this model. We showed that our model, when analyzed through the double lens of a) a very specific CHW tasks, such as RMNCH-focused home visits and b) a well defined social context, such as disadvantaged communities in the city of Recife, was able to explain the results of the trial and was coherent with the information produced by the case study.

Our explanatory model, by allowing to identify factors influencing the performance of CHWs either as barriers or facilitators, implicitly provided suggestions for policies addressing these factors, thus *de facto* contributing to build an evidence-based theory of change about interventions aimed at improving CHWs' performance. Furthermore, both the qualitative review and the case study provided suggestions for actions that informants perceived of potential benefit for their work. The overall process ultimately generated both indirectly through the model, and directly through informants' views, a variety of policy options, ranging from very generic to quite specific, to improve the performance of CHWs across all their tasks.

These options need to be systematized taking into account the needs of policy makers and supported by the available evidence on their effectiveness.

Since policy makers implementers and possibly operational health researchers operate from different perspectives and have different level of responsibility with respect to CHW program implementation, it may be useful to present policy options not only as a

comprehensive compendium but also as different policy combinations, to be considered according to the levels of responsibility in the Brazilian health system.

Moving from the overall performance of CHWs to their specific RMNCH tasks, we can use the qualitative information gathered from the case study on the intervention trial, and the insights that our logical model allowed to obtain about the gaps in its design and implementation, to propose policy packages which, assuming the same aim of the trial, i.e. improving CHWs' performance in home visits to pregnant women, mothers and their babies, are intended to overcome these gaps and achieve better results. As single policy options and policy combinations differ in effectiveness, feasibility and financial viability, policy packages need to be complemented by prioritization criteria.

Based on these premises, the objectives of this final step of our work can be defined as follows:

1. To identify and systematize policy options to improve the performance of CHWs across all their attributions and tasks;

2. To propose policy packages which, assuming the same objective of the intervention trial, i.e. to improve CHWs' performance in RMNCH, make an attempt to overcome its design and implementation gaps.

2. Methods

2.1 Identification and systematization of policy options to improve CHWs' performance across all their tasks

2.1.1. Inclusion criteria

Criteria for including policies were:

a) The policy addresses one or more of the factors which consistently emerged from the qualitative review as influencing CHWs' performance, with at least a moderate degree of certainty (see Chapter I, Annex III). Since all factors can be seen as barriers or facilitators depending on the direction of their effect, whether negative or positive (e.g. missing or ineffective training is a barrier while

available and good quality training is a facilitator) we chose to identify all policies as actions aimed at overcoming barriers, i.e. to convert each factor into a facilitator.

b) The policy is coherent with current MoH policy documents and strategies regarding CHW program and the PHC policy, i.e. the PACS, the NPHCP and the FHS (MdS, 2012 and 2017)[2].

2.1.2 Systematization

Policy options to improve CHW performance and impact were systematized and described according to two different perspectives.

First, as a comprehensive list (compendium) of policies intended to address the factors which have been identified in both our review and case study as influencers of CHWs' performance.   Second, as policy packages corresponding to the main levels of responsibility recognized by the Brazilian UHS about the implementation of CHW program (MdS, 2012).

The first perspective is intended to provide a comprehensive policy compendium that may be useful to: a) program managers at all levels in identifying policies actions that best suit their needs within their range of responsibilities; b) researchers in testing causal hypotheses and designing interventions involving CHWs ; c) FHT staff members, CHW supervisors in evaluating/auditing their activities as part of quality improvement cycles, or simply as a way to better understand and meet CHWs' needs, including training and support; d) CHWs themselves to build awareness of their professional role and confidence in protecting and promoting their rights.

Although there could be many different ways to structure a policy compendium, we chose to use the WHO RMNCH Policy Compendium (WHO, 2014b) as a reference model for this purpose. Reasons for this choice were: 1) the RMNCH Policy Compendium adopts a comprehensive health system and social determinants of health view; 2) it focuses on RMNCH issues which is also the focus of our work; 3) it has a relative simple

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[2] A new NPHCP (PNAB) was approved in August 2017 well after this research work was finalized. However, the new policy does not introduce organizational changes that modify the rationale for the proposed policy options (MdS, 2017b). The implications of the new policy for the role and tasks of CHWs are briefly described in the discussion section of this chapter

structure providing for each thematic area the main policy contents and the references (official documents describing the policy contents and published articles summarizing the available evidence about the effectiveness of policies and interventions). For our purpose, only systematic reviews have been considered as references for evidence of effect. Single studies and reports – literature on CHWs is immense - were not considered.

The second perspective targets policy makers at five different levels - Federal, State, Municipal , District and team level - and indicates, among the policies included in the policy compendium, which of them fall under these different levels of responsibility. Levels of responsibility - at Federal, State, Municipal , District level - are identified by the NPHCP (MdS, 2012 and 2017). A fifth level of responsibility, the FHT, has been added to describe what can be done at the micro-level as well.

2.2 Policy packages to improve CHWs performance in RMNCH and prioritization criteria

These are presented modularly, ranging from the most simple, feasible and least expensive combination of interventions, which can be developed and implemented at District Level, to the most complex, potentially most effective yet institutionally politically and financially engaging policy mix which requires the combined commitment of State and Municipal authorities.

Recognizing that prioritization is a necessary although not always explicit step in policy making, we made also an attempt to propose a model to assess the components of the three policy packages, so far listed as they were of the same importance and feasibility, according to priority criteria. According to WHO (Schmets et al., 2016) five criteria should be considered in any explicit prioritization exercise: burden of disease, effectiveness of the policy/intervention, feasibility, financial viability and equity. Out of these five criteria, the first is not applicable to our case since the CHW program is supposed to address most of the main burden of disease causes, thus it is by definition "burden conscious". We could also assume that CHW programs explicitly prioritize vulnerable communities, thus are supposed to imply an equity focus. However, some

specific policies, such as those addressing social determinants of health, have a specific equity focus.

Therefore we considered four criteria for inclusion in the model. The first criterion is the expected impact of a policy according to the available evidence on its effectiveness. The second is the feasibility of a policy which includes: the political space (consensus at political level as well as the level of health providers and users), the institutional procedures which may be necessary to have a policy approved by the responsible authorities, and the challenges of the implementation process. The third is the available resources (financial, human, infrastructural) which are needed to implement a specific policy. The forth is the expected impact on social and health inequalities.

3. Results

3.1 Compendium of policy options to improve CHW performance

The explanatory model developed in the first part of the research (Chapter I) and further refined by the case-study (Chapter II) identified factors influencing the performance of CHWs as belonging to two main blocks:

a) the formal health system, including sub-system elements of CHW programs;

b) the community system;

Factors related to interactions within the FHT and to interactions between CHWs and community have been included in the formal health system and the community system respectively.

Accordingly, the compendium is presented in two separate tables, indicating policies related to the health system (Table 21) and policies related to the community system (Table 22).

Tables are showing:

a) In the first column: factors that have been identified by the qualitative literature review (Chapter I) and/or by the case-study (Chapter II) as influencing CHWs' performance. As described in methods, factors are presented here as negatively influencing CHWs' performance, i.e. acting as barriers.

b) In the second column: main policy contents. Both the review (Chapter I) and the case-study (Chapter II) provided clues for identifying policies perceived by informants of potential benefit for their work. Although this information was mainly anecdotal, not systematic and frequently indirect, we thought it was worthy indicating when the identification of a policy content is supported by the findings of the qualitative literature review (indicated in the table as LR) and/or the case study (indicated as CS).

In the third column: references to publications that provide the details of policies and/or report the evidence of effectiveness (the latter in *italics*). Only international supporting documents are mentioned since coherence with the main national (Federal) policy documents is assumed as requisite for inclusion of policies in the list.

Table 21 Policies to improve CHWs' performance. a) policies addressing the formal health system

Factors identified as barriers to CHW performance	Main policy content	Supporting documents
Human Resources (CHW specific)		
Precarious contracts No opportunities for career advancement Initial training frequently missing or partial CPD absent or fragmented and/or vertically imposed Training methods insufficiently interactive and not oriented to daily practice and problem-solving Lack of professional incentive system or criteria not shared with CHWs Lack of representativeness of CHW in organisms responsible for CHW program	Avoid/limit short-term contracts and discourage high turnover (LR, CS) Provide opportunities for career advancement (LR, CS) Ensure initial training as requisite for employment according to nationally agreed standards (LR, CS) Ensure a minimum hours/year of CPD with contents identified in consultation with CHWs (LR, CS) Ensure that training programs for CHWs meet nationally agreed standards, include action-oriented training contents, interactive methods -oriented (LR, CS) Develop and pilot professional and financial incentive systems in consultation with CHWs (LR, CS)	WHO, 2008b, p. 7-12 and 39-41; *Buttha et al., 2010, p. 24-41 (generic tasks) and p.56-116 (RMNCH tasks)*; WHO, 2012, p.76-78; WHO, 2010a, p.17-34; USAID, 2012, p. 36-38; WHO 2007a, p.24-35.

	Involve CHWs in program coordination and support at District/Multi-District level (LR) Set up supportive bodies (councils, unions, associations) for CHW to establish scopes of practice, standardized training, career development paths (LR)	
Human Resources (other health professionals working in FHTs)		
Lack or insufficient supervision and/or inadequate supervisory attitude and skills Poor recognition of CHWs' role and supportive attitude among other health professionals and managers	Provide clear guidance for health District managers and FHT coordinators about role of CHWs, their duties and rights, and their supervision and coordination (LR,CS) Provide training in supervisory skills to FHT nurses in charge of CHWs (LR, CS) Make sure that FHT nurses and doctors are aware of CHWs training needs and acquainted with the content of training provided to CHWs (LR, CS)	USAID, 2012, p. 36-38; WHO 2010a, p.17-34; WHO, 2012, p. 76-78; *Buttha et al, 2010*; p. 24-31; WHO, 2007a, p.24-25; *SCIE, 2012*; *Engender Health, 2001.*
Service delivery modes		
Poor responsiveness of health services to requests and referrals by CHWs Inadequate feedback information to CHWs from health services about referred patients Excess of workload for FHT members, including CHWs	Set up at District and FHT level mechanisms to monitor responsiveness of HS to cases referred by CHWs and feed back of information to CHWs Enforce staffing requisites as defined by Federal and Municipal standards (LR, CS)	USAID, 2012, p.36-38; *Buttha et al., 2010*; *p. 24-31.*
Information system		

Data collection tools not user-friendly and of little or no usefulness for local situation analysis and planning Excess of time-consuming ad hoc surveys and bureaucratic and administrative tasks	Identify within Federal IS requirements a set of information to be analyzed and used at District and FHU level (LR, CS) Simplify data collection requirements and tools in consultation with expected users and avoid overburden of ad hoc data collection (LR, CS) Consider introduction of simple practical data collection for use at FHU level (LR) Consider other health professionals (e.g. social service) for collecting data for administrative purposes	WHO, 2008c, p. 67-68; UN, 2011, p. 9-11; WHO, 2011c, p. 9-13.
Financing		
Performance based incentives focusing exclusively on quantitative outputs	Design and pilot result-based financial incentives, including quality of performance, in consultation with expected users (LR, CS) Identify performance indicators for District managers and FHU coordinators regarding CPD, support and supervision provided to CHWs (LR, CS)	USAID, 2012, p.36-38; *Buttha et al., 2010,24-31.*
Leadership		
Lack of guidance on CHW program and of involvement of CHWs in monitoring evaluating and planning	Set up and/or ensure functionality of multi-district/municipal level coordination/supervision technical group with participation of CHW representative (LR, CS) Make sure that training and updates for District and Municipal managers include aspects related to CHW program (LR)	USAID, 2012, pages 36-38; *Buttha et al., 2010, 24-31.*

Table 22 Policies to improve CHWs' performance. b) policies addressing the community system

Factors identified as barriers to CHW performance	Main policy content	Supporting documents
Community's poor understanding of scope and limits of public health system/ service delivery modes and levels of responsibility

Specific poor understanding and recognition of CHWs' role, tasks and limitations
Inappropriate outdated practices and beliefs about health and disease
Weak community social cohesion and family ties
Socio-economic conditions and environmental hazards (hygiene, sanitation, housing, education, violence…) | Set up and/or ensure functionality of mechanisms for community involvement and consultation to monitor and assess interventions and address emerging issues and attribute role to CHWs (LR, CS)
Define communication packages (key messages, key channels, key activities and key audiences based on priority areas of the FHS, i.e.: E-messages, leaflets) with involvement of CHWs (LR)
Consider, develop and evaluate ways of collaboration with other sectors (for example, water and sanitation, nutrition, transport) to provide CHWs with a minimum portfolio of interventions
Promote at Municipal and District levels multi-sector plans to: protect the right to water, sanitation, shelter, prevent discrimination and all forms of violence and abuse, set up emergency preparedness plans (LR, CS) | WHO, 2008a, p.63-64 and 67-69; USAID, 2012, p. 36-38; *Marston C. et al., 2013; McCoy D, et al., 2012;* UN Women, 2013; p.22-32; WHO, 2010c, p. 9-12 *Prost et al. 2013*; CORE, 2004, p. 15-43 *Naugle et al., 2014; Higgs et al., 2014; Farnsworth et al., 2014;* UNPSDH, 2013, p.5-8. |

3.2 Policy options according to level of responsibility in the Brazil's health system

In Brazil, there are four main levels or responsibility related to CHW program: the Federal level, which defines recruitment criteria, training requirements, roles, tasks within the FHUs, the main contractual features and provides financial resources; the State level which concurs to define guidance and provide financing; the Municipal level, which is responsible of the concrete implementation of policy guidelines including selection criteria, workload, training updates, supervision; and the Health District level,

which is ultimately responsible of the daily management of the program, activity plans, monitoring, etc. (MdS, 2012).

In this section the same policy options described in section 2 are grouped according to these different levels of responsibility. As mentioned in the introduction to this chapter, we added a further level of responsibility which is the FHT level. This because there are several policies that may be adopted at this micro-level, in full coherence with the broader policy framework, but without the need of complex, politically and institutionally engaging procedures, and without major financial investments. This offers a possibility to introduce some change starting from the most peripheral articulation of the system, which may not be the most comprehensive approach, yet it may be the only possible one (Table 23).

Table 23 Policy options to improve CHW performance according to the level of responsibility - Federal (Fed), State, Municipal (Mun), District (Dist), FHT

System	Main policy content	Fed	State	Mun*	Dist	FHT
Formal health system	Provide guidance for Health District managers and FHT coordinators about CHWs' role, duties, rights, supervision and coordination	√	√	√	√	
	Provide training in supervisory skills to FHT nurses in charge of CHWs		√	√	√	√
	Set up at District and FHT level mechanisms to monitor responsiveness of HS to cases referred by CHWs and to ensure feed back information to CHWs			√	√	√
	Identify within Federal IS requirements a set of information to be analyzed and used at District and FHU level			√	√	
	Simplify data collection requirements and tools and avoid overburden of ad hoc data collection	√	√	√		
	Develop and pilot introduction of simple practical data collection for use at FHU level			√	√	√
	Consider other health professionals (e.g. social service) for collecting data for administrative purposes	√	√	√		

	Design and pilot result-based financial incentives, including quality of performance to be defined in consultation with CHWs	√	√	√		
	Include among performance indicators for District managers and FHU coordinators regarding CPD, support and supervision provided to CHWs	√	√	√		
	Set up at Multidistrict/municipal level a coordination/supervision technical group with participation of CHWs' representatives		√	√		
Community System	Set out or strengthen mechanisms for community involvement and consultation to monitor and assess interventions and address emerging issues and attribute role to CHWs	√	√	√	√	√
	Define community communication package (key messages, key channels, key activities and key audiences based on priority areas of the FHS defined by working group (E-messages, leaflets) with involvement of CHWs	√	√	√		
	Consider, develop and evaluate ways of collaboration with other sectors (for example, water and sanitation, nutrition, transport) to provide CHWs with a minimum portfolio of interventions	√	√	√		
	Include in PHC strategy the proactive promotion of multi-sector plans to: protect the right to water, sanitation, shelter, prevent discrimination and all forms of violence and abuse, set up emergency preparedness plans	√	√	√		

*depending on the size of each municipal territory, as some policies may require collaboration among many.

3.3 Policy packages to improve the performance of CHWs in RMNCH

Three different scenarios for policy development and implementation are considered. The context assumed for all scenarios is the same as in the case-study, i.e. Pernambuco

State and Municipality of Recife, the State Capital. All scenarios assume that the Federal policy documents such as the NPHCP and FHS, which are under the responsibility of the Federal government, remain unchanged. All scenarios are based on the evidence emerging from both the literature review (Chapter I) and the case-study (Chapter II) i. e. that in order to improve CHWs' performance in RMNCH some systemic cross-cutting issues related to the role of CHWs are addressed. Of course, the possibility to address systemic issues decreases along the levels of responsibility and become minimal, yet still existing, at the micro-level of FHTs.

Policy packages include the main policy contents which are listed in the Policy Compendium, with the addition of specific RMNCH technical inputs, for example training, contents, guides, job-aids. Policy contents, for this specific purpose, have been here described with some greater level of detail than in the Compendium and may be further adapted to represent aspects of the policy that can be implemented at the micro-level, for example the identification of community consultation mechanisms may be narrowed down to the identification of specific community stakeholders.

The first scenario (Box 6) assumes that no commitment is taken at Municipal level and that a few interventions can be implemented only in one or two districts, i.e. at a scale similar to that of the intervention trial analyzed in Chapter II.

Box 6 RMNCH-specific limited policy package

1. Specific RMNCH training
2. Action oriented RMNCH Guide
3. Nurses (1 per FHT) trained in guide content and supervisory skills
4. Periodical meeting among CHWs about the application of the guide
5. Set up, at District and FHT level, mechanisms to monitor responsiveness of health system to cases referred by CHWs and feedback information to CHWs
6. Ensure adequate time and space for periodical meetings at FHT together with the supervisory nurse to address difficulties arising in their work
7. Simple practical data collection for use at District and FHU level
8. Community stakeholders identified and involved in monthly meetings to monitor and assess interventions and address emerging issues

The second scenario (Box 7) assumes that the policy commitment is taken only at Municipal level (City of Recife), that the main policy focus remains RMNCH, and that some cross cutting issues regarding CHWs' work are addressed as functional to improve CHW's in RMNCH.

Box 7 RMNCH specific extended policy package

1. Program coordinators identified (doctor or nurse *plus* a CHW)
2. Specific RMNCH training
3. Action oriented RMNCH Guide
4. Nurses identified for supervision (1 per FHT) trained in guide content and supervisory skills
5. Periodical M&E meeting among all CHWs about the application of the guide
6. Minimum professional incentive plan (e.g. extra training opportunities, special mention for best performing CHWs)
7. Mechanism set up at District or FHT level to monitor responsiveness of HS to cases referred by CHWs
8. Adequate time and space for periodical meetings within FHTs to address difficulties arising in their work
9. Simple practical data collection tool for use at District and FHU level
10. Collaboration with other health professionals (e.g. social service) for administrative tasks
11. Community involvement & communication package defined by working group (E-messages, leaflets)
12. Community counterparts identified and involved in monthly meetings to monitor and assess interventions and address emerging

The third scenario assumes that State Government and Municipal authorities collaborate to develop a policy package to improve the performance of CHWs which includes not only RMNCH (comprehensive policy package, Box 8). This approach, fully recognizing that most barriers are of a cross-cutting nature and not specific of RMNCH technical contents, includes policies which are mostly aimed at improving the performance of CHWs irrespective of specific technical contents, and a few interventions addressing specific RMNCH related needs, particularly related to training and job aids and tools.

Box 8 Comprehensive policy package

Cross cutting components

1. Mandatory initial training of 1200 hours as defined in PACS, as requisite for CHWs to start working; mandatory 400 hours training for all CHWs which did not yet receive the training

2. Training ensured also for nurse professionals in charge of training and/or supervision

3. Continuous education plan that includes 40 hours of CE every 5 years, based on State and or Municipal priority areas

4. Minimum professional incentive plan (e.g. extra training opportunities, special mention for best performing CHWs)

5. Clear guidance for health district managers and FHT coordinators about role of CHWs, their duties and rights, supervision and coordination

6. CHW coordinators identified (nurse plus CHW) and given some monetary incentives

7. Result based financial incentive plan revised with participation of CHWs

8. Minimum toolkit for CHWs to use with community (transport vouchers, basic commodities e.g. for improving water and sanitation and nutrition at household level)

9. Specific administrative tasks assigned to other health professionals (e.g. social service)

10. Mechanisms to monitor responsiveness of HS to cases referred by CHWs and feed back information to CHWs

11.Adequate time and space for periodical meetings within the FHT to address difficulties arising in their work

12. Simple practical data collection for use at District and FHU level

13. Mechanism for periodical consultation with communities enforced

14. Community involvement & communication package defined by working group (E-messages, leaflets

15. Community counterparts identified and involved in monthly meetings to monitor and assess interventions and address emerging issues

RMNCH-specific interventions

16. specific RMNCH training, similar to that proposed in the intervention trial

17. action-oriented guide for all tasks related to RMNCH

18. essential RMNCH toolkit including simple job aids (e.g. communication leaflets, ECD

focused materials such as books, simple RMNCH data collection tool)

All policy packages should be discussed through a consultation process with health professionals' representatives and with community representatives and leaders. For the minimum package which could be implemented at District level, the consultation should involve all professionals.

3.3.1 Prioritization model

We propose here a model to assess the policy options included in the three policy packages according to priority criteria. The model could be used as an exercise not only at policy-makers level, but at different levels of the system as a way to increase the awareness about making policy decisions.

Table 24 shows how the model could be applied to a sample of policies included in the policy packages which have been previously described. This kind of assessment is highly contextual and are usable for multi-stakeholder Delphi-like consultations, and may be graded using Likert 5 scales (Likert, 1932; Grime & Wright, 2016).

Table 24 Proposed framework to prioritize policy options to improve the performance of CHWs, applied to a sample of policy actions

Main policy content	Expected impact	Political institutional and implementation feasibility	Financial viability	Equity
Mandatory initial training (CHWs)				
Training in teaching methodologies and supervisory skills (I&S nurses)				
CPD plan (CHWs)				
Professional incentive plan (CHWs)				
Guidance and performance indicators regarding CHWs roles (District managers and FHU coordinators)				
Result based monetary incentive plan (CHWs)				
Minimum toolkit to be used to address typical community issues such as transport vouchers, W&S and nutrition basic commodities (CHWs)				
Community integrated multi-sector social plan				
Guidance on periodic consultation of community health council				

4. Discussion

4.1 From analytical modeling to policy development: strengths and limitations of the process

In this last step of our work we made an attempt to use the products of the two previous research steps to provide, assuming the Brazilian UHS and specifically the CHW program as the context, some guidance to policy makers at all levels, and indirectly to researchers interested in health system/operational/implementation research.

The exercise of moving from the identification of factors influencing CHWs' performance and their dynamics to define policy options was based on an analytical model built on the results of a systematic review of qualitative studies on CHWs in Brazil, which represents a specific strength of the approach. Once a factor is identified by the model as acting as a barrier or, potentially, as a facilitator the logical consequent policy is aimed at eliminating or mitigating specific barriers or enhancing specific facilitators. We acknowledge that this exercise could considered rather straightforward. Still, it is not easily encountered in daily policy-making practice.

Our analysis is contextualized to a specific health system, which adds specific value to our work with respect to analyses and recommendations regarding CHWs currently available globally (Buttha, 2010; UNAIDS, 2012). We tried to make sure that the proposed policies were coherent with the national (Federal in the case of Brazil) overarching policies regarding PHC and the CHW program in particular.

A further information provided by the policy compendium regarding the main policy contents is about whether the policy options were mentioned by informants, mainly CHWs or other members of the FHTs. This information was taken from either the literature review or the case-study.

Finally, the policy option compendium was accompanied by the evidence and consensus available globally on CHWs. We adapted for the purpose of our work a policy systematization that was developed by the leading UN agency devoted to health, i.e. WHO, for the RMNCH area (WHO, 2014b). Other approaches may be used such as separating the programmatic components of the PABS related to CHWs from the overall formal health system components.

The limitations of our work are to be found in the fact that it is essentially the product of an individual exercise, though informed by evidence from the literature and a case study. We acknowledge that the involvement of policy makers and implementers would have added value to the work. This was not possible due to time constraints and the rapid turnover of cadres caused by the period of financial and political instability.

Furthermore, while we claim the strength of our policy development work represented by the contextualization to a specific context (the Brazilian health system), we acknowledge the need of its further adaptation to the variety of epidemiological, social

and health system contexts in Brazil, which are quite variable from North to South and within States and metropolitan areas, including a range of situations similar to those encountered at global level in low, middle and high income countries.

4.2 How the proposed policy options compare with the international literature and recommendations

The proposed policy compendium has been primarily conceived as related to the entire range of tasks attributed to CHWs and not only to RMNCH tasks, and therefore addressing the full range of issues regarding their performance. This is in full alignment with the results of international reviews (Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015) and of our own findings concerning the fact that single task-related performances, as well as groups of task-related performances such as those pertaining to the area of RMNCH, cannot be successfully improved without considering cross-cutting, systemic issues regarding CHWs' role, from selection and training to task attribution, supervision, incentive system etc.

Addressing specifically RMNCH-related performances requires a combination of policies that, while trying to improve specific knowledge, attitudes and practices, attempt to remove some of the barriers that impact on the general KAP and self-perception of CHWs and on the way they are viewed by other professionals working in the FHTs and by the communities they live in.

Having assumed this as the underlying principle for whatever policy aimed at improving CHWs' performance, and recognizing that many of the suggested policies may be quite similar than those that could be applied to many other health issues or health professionals, such as those regarding selection, training, supervision, data collection and use, etc., there are some interesting aspects regarding specific policies and interventions that may be worthy discussing, in the light of the findings reported in Chapter I and II, as having specific implications for CHWs, at least in the their current status and role in the Brazilian UHS.

A first aspect, emerging mainly from the case study, is the fact that, in spite of common sense and experience suggesting that all public servants, and particularly the less paid, are not particularly happy to have their tasks and workload expanded, most of the CHWs involved in the educational training trial expressed, in the interviews and focus

group they were involved in, their enthusiasm for being trained in early childhood development and intervention principles and practice, and for acquiring new competences to be spent with families and particularly with mothers. They felt empowered by new knowledge and skills they felt to increase their professional status and to restore the role of health promoters for maternal and child health for which they had been originally set up as a new professional typology in the Brazilian health system. This may mean that, in spite of all the existing challenges and difficulties regarding their role, there is room for introducing new tasks to the extent they are perceived as empowering and not just overburdening them. Of course, provided that training is effective, interactive, and action-oriented, that clear guidance on their specific tasks and referral criteria is given, supervision and opportunities to seek advice are offered. This is an interesting observation in relation to the current debate about the potential role of CHWs in contributing to child development (Yousafzai et al., 2016).

A second aspect regards the incentive system. Both financial and non-financial are hotly debated and evidence is so far contradictory (Willis-Shattuck et al., 2008; Singh et al., 2015). CHWs have expressed mixed, prevalently negative feelings about incentive systems, mainly because they are not involved in identifying indicators and measures, and because performance indicators are merely quantitative and end up with being distortive of their role. To this respect, more attention should be given to non-financial,professional incentives, such as opportunities to be updated or acquire specific skills, or have opportunities of career progress within the system, for example by becoming CHWs coordinators or supervisors or trainers.

Another way to strengthen CHWs' role and professional identity would be establishing - at Federal and State level or even within big Municipal entities – a professional body aimed at negotiating regulations, building professional identity, updating training contents and methods, ultimately providing opportunities to CHWs to feel as members of a learning community. These approaches have been proved to be effective in many countries (Buttha et al., 2010; WHO, 2007a) and should be seriously considered particularly in a system, such as the Brazilian, that made the strategic choice of fully integrating CHWs in the health system.

The identification of policy contents to address factors depending on the community system is somewhat less straightforward and supported by evidence than for health system policies. The existing international consensus is more based on a rights

approach. The WHO-PRMNCH Policy Compendium, although not specifically addressing the role of CHWs, provides several suggestions for policies to address multi-sector and community issues (WHO, 2014b).

Among all the policies listed for addressing the community system, many are not specific for CHWs, although they may influence their interlink with the community in an indirect way, as described in both our literature review and case-study. The only CHW-specific component is the idea of a minimum CHW portfolio to empower them *vis-à- vis* the community as a whole and *vis-à- vis* its individual members. This idea belongs to the very origin of CHWs broadly defined, including TBAs, to whom simple toolkit are provided for home deliveries and newborn health (Aboubaker et al., 2014). Most of the international literature on CHWs is consistently stressing the importance of the community context in shaping the possible role of CHWs and consequently their performance. Whatever policy addressing the role of CHW needs to be ambitious regarding the importance of a multi-sector approach. The latter should not remain confined to the adoption of principles of community participation and consequently to setting up committees at Municipal or District level, but should also assume a practical micro-dimension suitable to be handled by CHWs. For example, enabling them to provide transport vouchers to allow access to health facilities to people who otherwise could not afford the cost of a bus, or simple tools to intervene to improve housing and hygienic conditions. Besides their intrinsic value, these tools may offer an entry point for broader primary health care programming and may also lead to a better reception by the community of the key CHW services (USAID, 2012). The intrinsic efficacy *per se* and the spill-over effects on CHWs' role and prestige of such a toolkit is worthy being explored.

Communication strategies for behavior change should be a powerful ally of CHWs and need to be fully developed and their potential exploited, although the widespread, nowadays universal even in slums, availability of digital technologies may also turn out to be a problem to the extent the quality of information running on the net is not technically sound (USAID, 2012).

In conclusion, while acknowledging the limitations of our work, and particularly the subjectivity implied in translating our analysis of influencing factors into policies, we are encouraged by the fact that our main policy directions coincide with those of all international reviews and recommendations regarding CHWs (Glenton et al., 2013;

Gilmore, 2012; Perry, 2014; USAID, 2012; Kok et al., 2014; Kok et al., 2015; Buttha et al., 2010). This seems to imply that while contextualization is always necessary, many issues concerning the performance of CHWs remain consistent across systems.

4.3 Implications of the new National Policy for PHC

On August 31th the Three-party Managerial Commission (CIT - *Comissão Intergestores Tripartite*), approved a new NPHC (MdS, 2017b) which introduced several novelties in the system. Among these, CHWs are entitled to deliver simple clinical interventions such as measuring of blood glucose and pressure. According to the new policy, CHWs are not seen anymore as mandatory component of the FHTs, and the composition of the teams are left to local adaptation in consideration of epidemiological and socioeconomic needs. On the other side, more emphasis is put on training and supervision and further financial support is ensured to areas where there is lack of sufficient number of CHWs. In summary, more flexibility is introduced in the system and adaptation are left to Local (State and Municipal) authorities.

The new NPHCP (MdS, 2017b) opens to risks and opportunities regarding CHWs' role. Further shifting to CHWs of typical nursing tasks should not mean overturning their original mission, which is health promotion and prevention. New tasks may easily result in a reduction of time and focus on the old tasks. On the other side, attribution of new tasks could be an entry point for strengthening the role of CHWs vis-à-vis their communities (USAID, 2012), provided that their workload is adequate and allows for maintaining their strategic role while introducing new tasks. The evidence gathered in the case study regarding CHWs' interest for becoming vehicles of good practices for child development should be seriously looked at, as this may result very helpful in otherwise hard-to-reach communities (Phuka et al. 2014; Yousafzai, 2016).

Final discussion

The ultimate aim of our work was to contribute to the debate about how to improve the performance of CHWs in Brazil, a country where the CHW program has been conceived as a key strategic component of PHC, with a great potential to tackle inequities in health, including in RMNCH (Barros et al., 2012). This has been done through three research steps, each of which produced independent though interlinked products: the qualitative literature review, the analysis of the intervention trial and the policy compendium.

The review of qualitative studies carried out in Brazil confirmed the international literature findings by showing that although the main factors influencing CHWs' performance reside in the formal health system components and in sub-system elements of the CHW program, the community system is another powerful source of complex interactions that may act either as facilitators or as barriers of CHWs' performance (Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015). What our work adds to what has been shown by available studies and reviews on CHWs is that the patterns of influence of many of these interactions vary depending on contextual system factors, belonging to the formal health system or to the community system. This is for example the case of financial incentives and of the attribution of further tasks to CHWs. Both factors were perceived by Brazilian CHWs, but also by other health professionals working with them in FHTs, as being disruptive of their role, due to both their content, which was often felt inappropriate, and the decision process, which was perceived as highly hierarchical. Similarly, being resident in the community they serve entails complex implications that may end out with being predominantly positive or negative, depending on inherent features of both communities and individual CHWs. These findings further emphasize the importance of a contextual analysis of factors and their dynamics.

The review allowed to develop a logic model for CHWs' performance in Brazil, based on the main concepts developed at international level (Naimoli et al., 2014; Kok et al., 2014; Kok et al., 2015) and based on the evidence of qualitative studies which enables the identification, analysis and visualization of factors influencing CHWs' performance and their underlying mechanisms in the implementation of CHW program. This theory-

driven model represented the underlying conceptual framework for the two following research steps, the case study and the policy options.

The case study, through an analytical appraisal of an intervention aimed at improving the performance of CHWs in RMNCH-related home visits (Melo e Lima et al., 2017), and the qualitative insights into the work of CHWs provided by study participants, allowed further insights into the dynamics influencing CHWs' performance. By confirming the validity of the logical model developed in the first chapter to analyze and interpret the result of the intervention, we were able to show that the model can be useful also for the evaluation of the design and implementation of complex interventions such as those aimed at quality improvement (White, 2009). By explaining the reasons of the partial failure of the intervention, the model helped to elucidate the gaps in the intervention design and in the underlying theory of change, and implicitly provided hints about how interventions and policies aimed at improving specific CHWs' performances should be conceived.

This second step opened the door for an attempt to use our model as a generator of policies, grounded on the evidence collected about the barriers to performance, their mediators of effect and causal mechanisms. The Policy Compendium is a summary of such policies, which can be then packaged according to the level of responsibility and the scope of the intervention, whether including all CHWs' tasks or limited to RMNCH-related tasks.

The main products of our work, the logical model and the compendium of policy options, could serve for different purposes:

1. The logical model, populated with institutional and behavioral facilitators and barriers, can be used to identify specific areas that require action for program strengthening;

2. The policy options, systematized according to main health and community system components, and by level of responsibility, can be used to develop policy packages suitable at the various level of the system.

The transparent and systematic methodology of collecting evidence on factors influencing CHWs' performance we proposed could be used in operational/health system research, policy and program design and evaluation, quality improvement interventions (White, 2009; Funnel, 2011). The use of a theory-based approach offers an in depth and context-specific logic model that opens the "black box" of connections between CHWs program design and its real implementation, casting light on hypothesized and actual causal links, on expected effects in terms of impact on CHWs' performance and ultimately on health outcomes.

The products of this work may result useful to different types of stakeholders: health authorities, health policy makers and analysts at Federal, State and Municipal level, health program evaluators, researchers and health professionals. One of the findings of our work was that it may be useful even at the micro-level of FHUs and FHTs, as shown in the "minimum" policy package described in Chapter III. To this respect, while we recognize that the findings of our work have not added much to what was already known about factors influencing CHWs' performance, we think that the policy products are well suited for a locally contextualized and participative policy development process.

Due to the richness of the Brazilian experience with CHW programs, and the high standing of the Brazilian program globally, our exercise could benefit also policy makers who are interested in integrating CHWs in their health systems or to develop and implement large-scale CHWs interventions in Low and Middle Income countries.

One of the main overall lessons learnt, which soon emerged from both our review and our direct dialogue with CHWs and other professionals involved in the intervention trial in Recife, was that interventions aimed at improving specific tasks of CHWs cannot be effective, even if the intrinsic content of the specific intervention is valid, if not combined with actions aimed at overcoming the systemic barriers that may impede specific inputs, such as for example training, to be translated into practice. This is in line with the recent developments in the debate regarding vertical, single-disease or disease-cluster focused projects. They may just fail to achieve their objectives or soon face lack of sustainability if not matched by interventions aimed at strengthening the whole system (WHO, 2007b; Rao et al., 2014; Sundewall et al., 2012)

The epistemological method adopted for the intersection of quality improvement approaches and system thinking in health proved to be conceptually fertile, and its encounter with CHWs' performance through the lens of RMNCH seemed to produce results and tools that may be transferred to other areas of health, such as chronic disease and disability. We also confirmed that system analysis must consider qualitative information as key in providing insight into causal links and dynamics (Gilson, 2012), as it has been recommended by recent consensus about CHW programs (USAID, 2012).

We recognize the limitations of our work in all the three main steps and ultimately in the level of evidence that we were able to provide for all the results. These limitations have been discussed for each specific step and product. The main overall limitation was that the work, despite the extended and diverse contributions of the many health professionals, policy makers and researchers whom we had the opportunity to meet and have formal and informal dialogue and discussion with, was mainly the product of an individual effort. One of the future planned actions is a formally organized check of our analytical approach, findings and policy suggestions with other researchers and stakeholders involved in CHW programs.

Another important limitation of our work has been that, despite the role that our own model attributes to community system factors in influencing CHWs' performance and their ultimate health outcomes, the perspective of the communities has been largely missing in the literature review, due to lack of studies focusing on this perspective, as well as in our own qualitative insight into the intervention trial. Studies assuming this perspective are needed In Brazil as well as elsewhere, to complement the health professionals' and policy makers' perspective.

Furthermore, we acknowledge that in the complex interlinks between specific systemic inputs and their effect on CHWs' performance, there are still dynamics that require to be specifically investigated. For example, while we agree on the need for improved, action-oriented training and continuous professional development for all CHWs, still we should be aware that even the most effective training can produce no effect or even negative effects depending on other contextual factors. CHWs may for example feel frustrated by the inability to perform what they have been trained for, due to a variety of reasons depending on available infrastructure, workload, team work and other

factors. Factors influencing motivation and actions to enhance motivation represent by its own a broad field for further investigation (Ballard and Montgomery, 2017).

Finally, while we claim the added value of our work represented by its contextual focus on the Brazil's health system, we recognize that intra-country regional variations in epidemiological, socio-economic and cultural features are so strong that a robust adaptation still needs to be made to our approach to take into account these variations. The new national PHC policy which was delivered after the finalization of our work seems to address this issue by allowing greater flexibility to State and Municipal authorities in designing and implementing their PHC services including the role of CHWs.

For sure, the approval of the new policy makes even more compelling the case for a policy dialogue around the role of CHWs. We believe that the evidence gathered through the literature review regarding the main barriers to CHWs performance, the insight provided by the case study and the policy options can be used as an analytical platform for leveraging a dialogue involving all partners: federal, state and municipal level health authorities as well as other key stakeholders such as professional organizations and communities. CHWs themselves are called to participate with their views and constructive propositions.

At Federal level, discussion should aimed at clarifying how federal regulations and policies could best support State and Municipal Government in optimizing the performance of CHWs within the new PHC system. Issues such as training, incentive system, data collection and other that have emerged as prominent should be addressed and policy options considered. However, given the greater flexibility introduced by the new NPHC, it seems that State and Municipal level are the most suitable policy environment for such a dialogue. Policy options could be submitted to different types of stakeholders (health authorities, grass-root associations, health professionals). Future efforts, though, should be targeted not only to how best to organize and staff health services, which appears the primary concern of the new national PHC policy, but also to how to introduce quality in the system, and specifically how to improve the performance of such a special typology of health workers as the CHWs. Continuous professional development, team work, supporting supervision, and quality cycles should not deserve less attention than more structural themes. Human resource management

remains a strategic factor for responsive health services and within this motivated health professionals is a key element (WHO, 2007b and 2008b; Dieleman and Harnmeijer, 2014; Ballard and Montgomery, 2017).

Personal remarks

Besides the evidence systematically collected, my field experience in direct daily contact with CHWs and the many hardships of the *favelas* served to strengthened my belief that CHWs, in spite of all the barriers that make their work difficult and the impact uncertain, are providing essential services to individuals as well as to communities.

CHWs are sentinels of the system and end up with playing the difficult role of health system interpreters and buffers. They are the among the first to capture inefficiencies and gaps in both the health and the social systems and among the first to suffer their consequences. They are the first to understand the limitations of medical interventions in contexts where the role of social determinants is absolutely prevalent, but also the first to realize the practical challenges of addressing these determinants in the everyday work.

I hope that the international and national debate and all current research efforts devoted to this issue will bring momentum and evidence to further develop and explore the potential of community health workers, who in many settings represent the only bridge to health available to poor people.

A step has been taken, which is beyond the scope of this work but well within its ultimate aim, to call policy makers of Pernambuco State and the Municipality of Recife and the CHWs who were involved in our work to discuss the results of the collective work which was done around the intervention trial targeting CHWs in two Health Districts. This step was planned for April 2018.

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Annexes

Annex I Advanced code book for data index

Code book of mediators of effects

CHWs knowledge, attitudes and practices (CHWs' KAP)
FHTs knowledge, attitudes and practices of other health professionals (FHTs' KAP)
Team work

Code book of systemic inputs

System	Inputs	Factor	Sub-category 1	Sub-category 2
Health system	Human resources	CHWs selection criteria and process	Selection interview	
			Educational background	
			Residency	- Job opportunity in precarious contexts - Close ties between CHWs and patients - Work space is the living space
		CHWs working conditions and preconditions	Professional status	- Contract and salary - CHWs representation - Professional career plan
			Initial training and CPD	- Opportunities and continuity - Timing - Content - Methods.

			- Opportunities and continuity - Content - Methods
	Human resources of family health teams	Support and supervision	
		Number and availability of staff (turnover)	
		Qualification and background	
	Leadership and governance	Intersectorial policies, programmes, guidelines and actions for the area served by CHWs	
		Coordination and support of health managers to health units	
		Knowledge, attitude and skills of health managers	
	Service delivery modes	CHWs Volume of patients	
		CHWs Task attribution	
		FHTs Volume of patients	
		FHTs Task attribution	
	Other health system factors	Responsiveness of health system	
		Private health plans	
	Infrastructure and equipment	Availability and quality of material	
		Availability and quality of space	
	Information system	Understanding of IS tools, methods, uses and objectives	
		Appropriateness of IS tools,	

		methods, uses and objectives for the context		
		Ownership of IS tools, uses, objectives and mechanisms by FHTs		
	Financing	Understanding of incentive system and objectives		
		Appropriateness of targets and indicators to the context		
		Ownership of targets, indicators and objectives by FHTs		
Community system	Individual and collective knowledge, attitudes and expectations in relation to health and health services	Understanding of scope and limits of public health system	- Health services - Models of care - Health professional roles -CHWs tasks.	
		views about health and disease		
		Social recognition of and trust in CHWs		
	Social networks and attitudes to problem solving	Social cohesion		
		Family ties and organization		
	socio-economic conditions	Socio-economic resources		
		Environmental hazards, hygiene, sanitation, housing, education (...)		

Annex II – Data extraction form of studies included in the review and list of references by ID number

ID	Author (Year)	Title	Objective	Setting (State)	CHW	FHTs	USER	HMs	OTH
				Participants					
1	Budo et al. (2010)	Redes sociais e participação em uma comunidade referenciada a uma unidade de saúde da família	Describe factors that may influence the constitution of social networks and participation of a community referenced to a FHU in a medium sized city in south Brasil	Rio Grande do Sul	X	X	X		
2	Costa et al. (2012)	Processo de trabalho dos agentes comunitários de saúde: possibilidades e limites	To describe and understand the work process of CHWs in a city of Rio Grande do Sul and identify its possibilities and limits	Rio Grande do Sul	X				
3	Bachilli et al (2008)	A identidade do agente comunitário de saúde: uma abordagem fenomenológica	To analyze what are the psycho-social factors that structure CHWs identity	São Paulo	X				
4	Araújo et al. (2009)	Saúde da família: mudando práticas? Estudo de caso no município de Natal (RN)	To analyze team work and practices (concepts and actors) for delivering service accordingly to ESF.	Rio Grande do Norte	X	X			
5	Azambuja et al. (2007)	Significados do trabalho no processo de viver de trabalhadoras de um programa de saúde da família	To understand the importance and processes of their job amongst workers acting within health units	Rio Grande do Sul	X	X			
6	Cezar-Vaz et al. (2009)	Risk perception in family health work: study with workers in Southern Brazil	To analyze the perpection of risk in the work process of health professionals working in family health units	Rio Grande do Sul	X	X			
7	Franco	Percepções de gestores	To describe the perceptions of health	São Paulo				X	

	Ili et al (2014)	municipais sobre ações de promoção da saúde: em foco os agentes comunitários de saúde	managers on health promotion activities conducted by CHWs						
8	Brigagão et al. (2009)	Oficinas de promoção de saúde: discutindo os dilemas do cotidiano de um grupo de agentes comunitárias de saúde	To reflect on the potential of active methodologies for discussing conflicts and problems experienced by CHWs in their daily activities and their continuous education	São Paulo	X				
9	Freitas et al. (2005)	Percepção da equipe de saúde da família sobre a utilização do sistema de informação da atenção básica SIAB	To analyze the perception of the SIAB within the family health teams and its use as a tool for organization of work	São Paulo	X	X			
10	Costa et al. (2011)	Percepções e motivações de agentes comunitários de saúde sobre o processo de trabalho em Teresina, Piauí	To describe the work process and related CHWs perception of it in Terezina	Piauí	X				
11	Binda et al. (2013)	O trabalho dos agentes comunitários de saúde em evidência: uma análise com foco na atividade1	To analyze working methods of CHWs working in a unit of the south-eastern Brazil	Espírito Santo	X				
12	Ávila (2011)	O Programa de Agentes Comunitários de Saúde no Ceará: o caso de Uruburetama	To analyze the activities of CHWs in terms of educational agent	Ceará	X	X		X	
13	David (2017)	O papel do agente comunitário de saúde no fortalecimento	To discuss the potential of CHWs in health education across their communities	Rio de Janeiro	X				

		da educação popular em saúde							
14	da Silva Santos et al. (2017)	Fighting violence under the family health strategy: challenges for health care	To describe which type of problems linked to violence are experienced by health professionals across the community they serve	Ceará	X	X			
15	Damasceno et al. (2012)	O acolhimento no contexto da Estratégia Saúde da Família	The objective of this study is to understand the perception of users and workers in relation to the reception within health units	Minas Gerais	X	X	X		
16	Carneiro et al. (2015)	Novos modelos de gestão do trabalho no setor público de saúde e o trabalho do agente comunitário de saúde	To discuss the partnerships between the Federal state and social organizations for the management of the health sector and in particular of CHWs work	Rio de Janeiro				X	X
17	Bonow et al. (2011)	Limites e possibilidades do desenvolvimento de grupos criativos na Estratégia Saúde da Família	To identify possibilities and limits for the organization of educational and creative groups by family health teams	Rio Grande do Sul	X	X			
18	Lima et al. (2011)	Conhecimento de Agentes Comunitários de Saúde sobre os instrumentos de coleta de dados do SIAB	To analyzed what CHWs know about the SIAB database and tools, and how they approach to it in their work	Paraná	X				
19	Cremonese et al. (2013)	Implicações do trabalho na saúde mental dos Agentes Comunitários de Saúde	To analyze suffering, experiences, perceptions and strength of CHWs of their work experience	Rio Grande do Sul	X				
20	Coriolano et	Grupos focais com agentes comunitários de saúde:	To describe the work process of CHWs.	Ceará	X				

	al. (2010)	subsídios para entendimento destes atores sociais							
21	Gabardo et al (2009)	Family Health Program professionals' view on family structures and health implications	To describe health professional perception on family's structures and their healthy behaviours	Rio Grande do Sul	X	X			
22	Alves et al. (2014)	Educação permanente para os agentes comunitários de saúde em um município do norte de Minas Gerais	To identify continuous education activities in support of CHWs in Mina Gerais	Mina Gerais	X				
23	Baralhas et al. (2013)	Prática diária dos agentes comunitários de saúde: difi culdades e limitações da assistência	To analyze difficulties encountered by CHWs in their daily practice	São Paulo	X				
24	Galavote et al. (2011)	Desvendando os processos de trabalho do agente comunitário de saúde nos cenários revelados na Estratégia Saúde da Família no município de Vitória	To analyze the work process of CHWs within the family health strategy in Vitoria	Espírito Santo	X				
25	Ferraz et al. (2005)	O cotidiano de trabalho do agente comunitário de saúde no PSF em Porto Alegre	To investigate how CHWs structure and organize their daily work and activities	Rio Grande do Sul	X	X			
26	Barbosa et al . (2012)	Educação permanente em saúde: uma estratégia para a formação dos agentes comunitários de saúde	To analyze the process of continuous education to CHWs led by nurses	São Paulo		X			
27	Costa	Agentes Comunitários de	To discuss dilemmas and deadlocks of	São Paulo	X				

	et al (2012)	Saúde:agenciadores de encontros entre territórios	access and affiliation of CHWs with the two systems they have to link (community and health system)						
28	Ferreira et al. (2009)	Processo de trabalho do agente comunitário de saúde e a reestruturação produtiva	To analyze work process and techniques of CHWs within health teams.	Bahia	X				
29	Fortes et. Al (2004)	O agente comunitário de saúde e a privacidade das informações dos usuários	To explore social actors and relationships involved between users privacy and CHWs.	São Paulo	X	X		X	
30	Santos et al. (2011)	Agente comunitário de saúde: perfil adequado a realidade do Programa Saúde da Família?	To understand the role and the work of CHWs in a small city	São Paulo	X				
31	Cardoso et al. (2010)	Comunicação no Programa Saúde da Família: o agente de saúde como elo integrador entre a equipe e a comunidade	To get an insight of CHWs perceptions, relationships and processes between them and other stakeholders involved in their work	Rio de Janeiro	X	X			
32	Bonfim et al. (2012)	Ações educativas em um Programa de Agentes Comunitários de Saúde	This study analyse the perspective of CHWs and nurse in relation to health education activities	São Paulo	X	X			
33	Lanzoni et al. (2014)	Community Health Agents: strategies and consequences of their network of relationships and interactions	This study aimed to identify the strategies used by Community Health Agents on their relationships network and interactions to improve health care and its impact on a health center.	Santa Catarina	X	X	X		
34	Elia et al. (2011)	A construção do plano local como atribuição das equipes de Saúde da Família: a experiência de	To analyzed how family health teams structure their collective actions	Rio de Janeiro	X	X			X

#	Author	Title	Objective	Location					
		três áreas programáticas do Município do Rio de Janeiro							
35	Azevedo et al. (2010)	The narrow entrance door of Brazil's National Health System (SUS): an evaluation of accessibility in the Family Health Strategy	Evaluate access to family health units and services based on users' perspective	Pernambuco	X	X	X	X	
36	Guanaes-Lorenzi et a. (2016)	A (des)valorização do agente comunitário de saúde na Estratégia Saúde da Família	To discuss how valorisation of CHWs is produced through their work and social networks	São Paulo	x				
37	Hildebrand et al. (2008)	Perception of the community health agent about the Healthy Family Program	To investigate the perceptions of CHWs regarding the FHS in order to identify strengths and weaknesses, for changing the health care attention model	São Sebastião	x				
38	Jesus et al. (2014)	Atuação do agente comunitário de saúde: conhecimento de usuários	To analyze users' knowledge of CHWs and FHTs	Bahia			x		
39	Levy et al. (2004)	Community health agent program: perception by patients and health service workers	To explore the perceptions of CHWs and the families served on CHW program	São Paulo	x		x		
40	Jardim et al. (2009)	Aspectos subjetivos do morar e trabalhar na mesma comunidade: a realidade vivenciada pelo agente comunitário de saúde	To explore the process of constructing and maintaining CHWs' credibility in relationships with their community and CHWs subjective experience of living and working in the same place	São Paulo	x				
41	Peres et al.	The community health agent and working as a	The objective of this study is to analyze the easy and difficult aspects of teamwork	São Paulo	x				

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	(2011)	team: the easy and difficult aspects	according to community health agents. To analyze the easy and difficult aspects of teamwork according to community health agents						
42	Sossai et al (2010)	O agente comunitário de saúde (ACS) e a comunidade: percepções acerca do trabalho do ACS.	This study aimed to identify the perceptions of CHWs and the community about CHWs work	São Paulo	x		x		
43	Wai et al. (2009)	O trabalho do agente comunitário de saúde: fatores de sobrecarga e estratégias de enfrentamento.	To identify stressors at work and coping strategies of CHWs.	São Paulo	x				
44	Martines et al (2007)	Vulnerability and suffering in the work of a community health agent in the family health program	To investigate the representations and significations of CHWs in relation to their the vulnerabilities in their work within the FHS	São Paulo	x				
45	Lopes et al. (2012)	Community health agents and their experiences of pleasure and distress at work: a qualitative study	To identify the situations that cause pleasure or distress at work among the CHWs	Rio Grande do Sul	x				
46	Nunes et al. (2002)	Community-based health workers: building the identity of this hybrid, polyphonic character	To analyze the identity-building process for CHWs in the context of their role in the FHS and FHTs team and their interaction with the residents of communities where they work	Bahia	x	x	x	x	
47	Oliveira et al. (2014)	Participação popular nas ações de educação em saúde: desafios para os profissionais da atenção primária	To analyze the social participation of the community in health educational initiatives under the FHTs	Ceará	x	x	x		

48	Spagnuolo et al. (2013)	Between the processes of strengthening and weakening of the Family Health Strategy	To analyze the processes of strengthening and weakening of the FHS model	São Paulo	x	x			
49	Silva et al. (2014)	Supervision of Community Health Agents in the Family Health Strategy: the perspective of nurses	To analyze the conceptions of supervision of nurses in the FHS in relation to CHWs, taking for reference the work process and the power relations	Goiás		x			
50	Marzari et al. (2011)	Community health agents: profile and education	To analyze the profile and education of the community health agents..	Rio Grande do Sul	x				

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Annex III - Review findings and their degree of confidence

Index of tables

Legend: (L.C.) = Logical connectors

$\updownarrow$ the same factor acts contradictorily irrespective of its implementation

↑↓   different forms of implementation could turn the same factor in a barrier or a facilitator

↑↓   the prevailing effect emerging from studies is positive

↑**↓**   the prevailing effect emerging from studies is negative

Table 1. Human resources

	Inputs	Mediators of effect	L.C.	Degree of confidence
CHWs selection criteria and process	**Selection interview**	CHWs' KAPs It increases the opportunity to select motivated candidates.	↑	Low confidence, poorly referenced
	Educational background	CHWs' KAPs It increases the presence of young and better educated CHWs, who can be more flexible to new working challenges. In turn, however, their higher education may mean less personal experience in low income communities.	↕	Low confidence, poorly referenced
		Systemic inputs: community Community members may identify themselves less with better educated CHWs.		Low confidence, poorly referenced
	Residency - Job opportunity in precarious contexts; - Close ties between CHWs and patients; - Work space is the living space.	CHWs' KAPs A. Being recruited as CHWs can be experienced positively as an honour, or negatively as the only working option, with consequences on CHWs' commitment; B/C. could positively motivate CHWs to work and help peers and friends, but also negatively influence their attitude towards personal enemies within the community, generate frustration for not being able to solve problem, and lack of privacy; B/C. could benefit CHWs' knowledge of the overall social context and values and relevant practical skills, although does not guarantee better management of individual cases.	↕	High confidence: study quality mostly medium to low, findings strongly homogenous and highly backed up by references
		Team work B/C. could favour team management of		

		patients through better connections between CHWs and community.		
		Systemic inputs: community B/C. could either strengthen or weaken social recognition, understanding, trust, access and penetration of CHWs.		
CHWs working conditions and preconditions	**Professional status** - Contract and salary; - CHWs representation; - Professional career plan	CHWs' KAPs A/B/C when precarious or missing negatively impact on CHWs' motivation and ambitions, identity, and commitment with the work.	↑↓	<u>Moderate confidence</u>; study quality mostly medium to low, findings strongly homogenous and adequately backed up by references
	Initial training and CPD - Opportunities and continuity; - Timing; - Content; - Methods.	CHWs' KAPs When not available, timely and relevant, they challenge CHWs' confidence, motivation, professionalism, and commitment. CHWs' knowledge about what and how to observe and advise gets limited, with a negative impact on their potential, appropriateness and completeness of case-management across different situations.	↑↓	<u>High confidence</u>: study quality mostly medium to low, findings strongly homogenous and highly backed up by references
		Team work When not available and timely, it hampers the potential contribution of CHWs to team work for the prompt and appropriate identification and management of cases.		
	Support and supervision - Opportunities and continuity; - Content; - Methods	CHWs' KAPs When not available and timely they affect CHWs' motivation, professional identity, self-esteem and confidence. Being also directly linked with training and CPD, CHWs'	↑↓	<u>High confidence</u>: study quality mostly medium to low, findings strongly homogenous and highly backed up by references

		knowledge and practice are not reinforced, nor supervised with consequent increased likelihood for errors and less room for improvements.		
		Team work When not available and timely it leads to weaken the potential and relevance of having multi-professional FHTs working with CHWs.		
		Systemic inputs: community When available and visible to the community, it may increase trust and recognition of CHWs' role.		
Human resources of family health teams	- Number and availability of staff (turnover) - Qualification and background	FHTs' KAPs When A. is limited, FHTs' professionals ability to perform their activities decreases; When B. are not tailored for PHC services, FHTs' professionals attitudes could be inadequate for CHWs (i.e.: hierarchical) and team work (i.e.: undervaluing), relevant knowledge partial (i.e.: soft skills and social determinants), and inadequate for practice.	↑↓	High confidence: study quality mostly medium to low, findings strongly homogenous and highly backed up by references
		Systemic inputs: human resources When A. is limited, and B. not tailored on PHC mission, training and support for CHWs get partial and inadequate.		
		CHWs' KAPs When A. is limited, and B. not tailored to PHC mission, CHWs' professional identity, confidence and motivation suffer, due to poor or inadequate team work and human resource management.		

		Team work		
		When A are limited, and B not fitted for PHC, team activities might not occur or be undervalued and inappropriate, with negative consequences for CHWs' KAPs.		
		Systemic inputs: community		
		When A. are limited and B. are not fitted for PHC, the availability of FHTs' members to reach the community could decrease and their attitudes with patients could be inappropriate. Community's reactions could be negative and impact on their perception of CHWs.		

Table 2. Leadership and governance

Inputs		Mediators	L.C.	Degree of confidence
Leadership and governance	Intersectorial policies, programmes, guidelines and actions for the area served by CHWs	CHWs' KAPs Their lack hampers the potential, reach and effectiveness of CHWs' activities, with negative consequences on CHWs' attitudes (frustration, stress, lack of motivation).	↑↓	Moderate confidence; study quality mostly medium to low, findings strongly homogenous and sufficiently backed up by references
		Systemic inputs: community Their lack decreases trust and recognition of CHWs and health services across the community, as a consequence of CHWs' failure for problem solving.		
	Coordination and support of health managers to health units	CHWs' KAPs When poor, they negatively impact on CHWs' professional identity, motivation and confidence.	↑↓	Moderate confidence; study quality mostly medium to low, findings strongly homogenous and adequately backed up by

		Indirectly, since they hamper the organization of relevant professional opportunities (i.e.: new trainings, support), and increase CHWs' workload, they negatively impact on CHWs' knowledge and thus on their practical potential.		references
		Team work When poor, they weaken team work, since they decrease their potential for planning and organizing actions relevant for the context (i.e.: support for events and situational analysis).		
	Knowledge, attitude and skills of health managers	CHWs' KAPs Hierarchical attitudes and inappropriate knowledge and skills for PHC goals decrease the motivation, opportunities and effectiveness of CHWs to engage with managers.	↑↓	<u>Low confidence</u>, poorly referenced

Table 3. Service delivery modes

Inputs		Mediators	L.C.	Degree of confidence
CHWs	- Volume of patients - Task attribution	<u>CHWs' KAPs</u> Their excessive amount negatively impact on CHWs' attitudes (stress, frustration, motivation, professional identity) and practice (relevance and quality of tasks).	↑↓	<u>Moderate confidence</u>; study quality mostly medium to low, findings strongly homogenous and highly backed up by references
		<u>Systemic inputs: community</u> Their excessive amount negatively impact s on the time dedicated to attend community members and the type of activities performed.		

	Inputs	Mediators	L.C.	Degree of confidence
		CHWs' gaps and failures contribute to decrease community's trust and recognition.		
FHTs	- Volume of patients - Task attribution	**Team work** Their excessive amount negatively impact on the potential and availability for team work, including CHWs' support, supervision and training.	↑↓	<u>Moderate confidence</u>; study quality mostly medium to low, findings strongly homogenous and adequately backed up by references

Table 4. Other health system factors

	Inputs	Mediators	L.C.	Degree of confidence
Health system network	- Responsiveness of health system - Private health plans	<u>CHWs' KAPs</u> The lack of A. and the existence of B. act negatively on CHWs' professional identity, stress, motivation and frustration, mainly as a consequence of community's experiences of care. <u>Systemic inputs: community</u> The lack of A. and the existence of B. (for those who can pay) increase community's mistrust and denial of CHWs and their services.	↑↓	<u>Moderate confidence</u>; study quality mostly medium to low, findings strongly homogenous and highly backed up by references

Table 5. Infrastructure and equipment

	Inputs	Mediators	L.C.	Degree of confidence
Working space and material	- Availability and quality of material; - Availability and quality of space	<u>CHWs' KAPs</u> Their lack decreases the potential of CHWs to conduct their activities, which impact negatively on their frustration, their mission and professional identity.	↑↓	<u>Moderate confidence</u>; study quality mostly medium to low, findings strongly homogenous and sufficiently backed up by references

		Team work
		Their lack decreases the likelihood of organizing team meetings and discussions
		Systemic inputs: community
		Their poor quality decrease the privacy of patients and of their experience of care, with negative reactions on CHWs

Table 6. Information system (PHCIS)

Inputs		Mediators	L.C.	Degree of confidence
Tools, methods and uses of IS	- Understanding of IS tools, methods, uses and objectives; - Appropriateness of IS tools, methods, uses and objectives for the context; - Ownership of IS tools, uses, objectives and mechanisms by FHTs	CHWs' KAPs Poor A. B. and C. impact negatively on CHWs' motivation to use the IS, and on their ability to use it properly. These gaps negatively decrease IS potential to support with knowledge of patients and collective health profiles, and thus to adapt CHWs' practice.	↑↓	Moderate confidence; study quality mostly medium to low, findings strongly homogenous and sufficiently backed up by references
		Team work Poor A. B. C. tend to decrease the overall motivation of teams to take care and advantage of the potential of the IS for team organization, planning and prioritization.		
		Systemic inputs: leadership and coordination Poor A. B. C. tend to produce unreliable information that are poorly informative for situational analysis of the communities, and so poorly useful for leaders, managers and policymakers.		

Table 7. Financing

	Inputs	Mediators	L.C.	Degree of confidence
Type and methods to release incentives	- Understanding of incentive system and objectives - Appropriateness of targets and indicators to the context - Ownership of targets, indicators and objectives by FHTs	CHWs' KAPs Poor A, B and C may divert CHWs' practices from their mission, increase the quantitative products, but not their quality, and negatively affect their professional identity.	↑↓	Moderate confidence; study quality mostly medium to low, findings strongly homogenous and sufficiently backed up by references

Table 8. Community system

	Inputs	Mediators	L.C.	Degree of confidence
Individual and collective knowledge, attitudes and expectations in relation to health and health services	- Understanding of scope and limits of public health system: * health services ; * models of care; * health professional roles * CHWs tasks. - views about health and disease - Social recognition of and trust in CHWs	CHWs' KAPs A poor comprehension of A. and B. might impact negatively on the interactions with the community and so the potential of CHWs' practice and knowledge on certain dimensions, which all have consequences on CHWs' stress, frustration, professional satisfaction and identity. Otherwise, a better or less resistant understanding can inversely benefits this cycle and CHWs motivation. C. is a consequence of the interplay of various factors already mentioned. Similarly to A. and B., when weak, it negatively affects CHWs' KAPs, but when strong it boosts primarily CHWs' positive attitudes.	↑↓	High confidence: study quality mostly medium to low, findings strongly homogenous and highly backed up by references

Social networks and attitudes to problem solving	- Social cohesion, security and safety - Family ties and organization	<u>CHWs' KAPs</u> When social cohesion is weak, the potential of CHWs' practice and access to information get limited, especially with hard to reach and isolated groups. This all negatively reflects on CHWs' frustration, professional recognition and stress. Conversely, when it is strong, CHWs' motivation and satisfaction get benefitted, and access to knowledge and practice are facilitated and supported.	↑↓	<u>High confidence</u>: study quality mostly medium to low, findings strongly homogenous and highly backed up by references
Individual and collective socio-economic conditions	- Economic resources; - Environmental hazards, hygiene, sanitation, housing, education (…).	<u>CHWs' KAPs</u> When conditions are weak, they badly impact on CHWs' problem-solving potential and effectiveness, might decrease the adequacy of CHWs' knowledge and contribute to negatively impact on CHWs' morale, frustration and satisfaction.	↑↓	<u>Moderate confidence</u>: study quality mostly medium to low, findings strongly homogenous and adequately backed up by references

Annex IV - Case-study presentation: background, objectives, methods, results (Melo e Lima et al. 2017a, b)

Background

The potential role of Community Health Workers (CHWs) in improving maternal and child health outcomes, particularly in low and middle-income countries and in disadvantaged communities is recognized. Adequate and focused training is among the key requisites for enhancing CHWs performances and research is necessary to identify effective training methods.

The most important task of the CHWs is the home visit (HV). According to the National Policy of Primary Care of Brazil (NPHCP), it is responsibility of CHWs, among others, to follow, through home visits, all families and individuals. The NPHCP recommends that the visits should be planned keeping, as a reference standard, the average of one visit/family/month but considering risk and vulnerability criteria, so that more visits are made to families with the greatest needs. CHWs must perform monthly HVs to all families of the area, to provide health information, prevent disease and promote health, identify problems and refer them to health services, ultimately acting as a bridge between the health services and the community. In order to do this effectively, HVs must be based on clear goals, adequate training and guidance. However, current recommendations fail to provide satisfactory guidance for HVs.

Although HVs performed by CHWs have been identified as key to achieve improved maternal, neonatal and child health (MNCH) and child development, official national guidelines and training materials for CHWs do not indicates specific tasks and referral criteria for specific prenatal periods and developmental stages during early infancy.

Building on the evidence about current CHWs' performance and training gaps, a RCT was designed to assess the efficacy of an action-oriented educational intervention for CHWs and FHT members in ensuring sustained improvement of knowledge, attitudes and practices of CHWs regarding prenatal and postnatal HVs and in promoting improved health-related practices in pregnant women and mothers.

Research objective

To assess through a controlled before-and-after trial the efficacy of an intervention (training + guide) in improving the performance of CHWs and the health-related practices in mothers regarding prenatal care and child health and development in the first 9 months.

Institutional research setting

The trial was part of a larger project funded by the Brazilian National Research Council aimed at improving the quality of MNCH care at hospital and community level, and implemented by a tertiary research hospital in Recife, the Instituto de Medicina Integral Professor Fernando Figueira (IMIP).

Methods

Population, study setting and participants: The study was carried out in the city of Recife, the capital of Pernambuco, a State in northeastern Brazil. There are 125 Family Health Units (FHUs) in Recife, distributed in 6 Health Districts (HDs). Each FHU includes one or two Family Health Teams (FHTs) composed by at least: a physician, a nurse, a nursing technician and four to six CHWs. The study population consisted of CHWs belonging to a group of 12 FHUs of 3 different HDs. The 12 FHUs include 18 FHTs, with a total of 86 CHWs. These teams assist a population of about 70.000 inhabitants (11.500 families) of 10 low-income communities (*favelas*).

Design: randomized controlled and before-after study. The 18 FHTs underwent blocked and paired randomization, and were divided into two groups (intervention and control) matched by main personal and catchment area characteristics. Each FHT was assumed as a block (with 4 to 6 CHWs each) and was paired with a neighbor FHT with similar population characteristics. To minimize contamination among CHWs belonging to the same FHT, each block of two FHTs was randomly allocated to either intervention or control group. Thus, each group included 9 teams. Seventy-eight CHWs belonging to Family Health Units in the city of Recife, Brazil, were randomly allocated to intervention and control groups. CHWs of the intervention FHTs were invited to participate in the

training. As the intervention was an educational training, it was not possible to blind the participants. The control group received the training 12 months later, after the data collection of the intervention group was finalized.

Intervention: The educational intervention consisted of a training course for action-oriented home visits to pregnant women, mothers and their infants. The intervention group took part in a four-day interactive training course based on an action-oriented guide to perform home visits to pregnant women and their infants throughout pregnancy and infancy until 9 months of age. The course objectives and materials, including the action-oriented guide, were designed collaboratively by a multidisciplinary group of experienced professionals in health education and maternal, neonatal and child health, based on updated international and national recommendations on prenatal and postnatal HVs carried out by CHWs, and on emerging training needs, according to classic instructional design methods. The *Training Course on Home Visits to Pregnant Women and Infants* was informed by pedagogy of autonomy and problem-based active methodologies. Case studies focused on participants experiences were used with active methods of learning followed by simulations, interactive lectures and small group activities, ultimately requiring 32 hours (4 days).

To ensure the integration of FHTs and provide support to the new tasks proposed for CHWs, a 16-hours course covering the same contents was delivered to physicians and nurses belonging to the same FHTs.

The *Guide for Innovative Home Visits to Pregnant Women and Infants* provides action-oriented instructions for each home visit, for a total of 10 visits, including 5 visits for the mother from conception to childbirth and postpartum period and 5 visits focusing on maternal health and on child health and development until the age of nine months. Tasks related to each visit are detailed and included what should be asked, observed and identified by CHWs, and actions to be taken according to a three-level risk classification.

The main contents addressed by the training and the guide included: assessment of mother's and infant's health and wellbeing, information on preventive practices and prenatal visits, information on care for labor and delivery, anticipatory advice on maternal and neonatal most common postpartum problems, essential care of the newborn, support to breastfeeding, nutrition, accident prevention and immunization,

assessment of infant development, promotion of practices that favor parent-child interaction, assessment of family environment, identification of socioeconomic and psychosocial problems and effective communication with parents and family.

<u>Timing</u>: The course took place in November 2015. Between November 2015 and November 2016, trainers were available for support throughout personal visits and by phone in case of doubts and difficulties about the use of the guide for HVs.

<u>Outcome variables and data collection:</u> For CHWS: average overall KAP score, and separated K, A and P score at one-year follow up as compared to baseline and to control group. Proportion of CHWs who improved their score, overall and in K, A and P section after training. For Mothers: proportion of pregnant women and mothers reporting practices corresponding with advice received by CHWs related to prenatal care and delivery care (17 items), family planning (9 items); prenatal promotion of child development (3 items), postnatal child health (17 items), postnatal promotion of child development (6 items).

The data related to CHWs were collected at three different times: before training (t0), immediately after training (t1), and one year after training (t2). Knowledge (K), Attitudes (A) and Practices (P) of intervention and control groups were assessed at t0 and t2. The KAP of the participants were assessed through a written questionnaire. Interviews with pregnant women and mothers to assess health related practices living in areas served by CHWs / FHTs belonging to intervention and control groups were collected between 6 and 12 months after the intervention.

Results

Fifty-nine CHWs completed all KAP assessments (31 in intervention and 28 in control group). Baseline characteristics were similar in both groups. At one year from training, the intervention group had significantly higher overall KAP score (p<0,001) as well as knowledge (p<0,001), practice (<0,001) and attitudes scores (p=0,047) than the control group, and maintained significant improvements with respect to baseline in overall KAP score (p< 0,001) as well as in knowledge (p<0,001), and practice (p<0,001) scores. In the control group, overall KAP, as well as separate knowledge, attitudes and practices scores remained unchanged.

Ninety-three pregnant women were interviewed (49 in the intervention and 44 in the control group). Ninety-one mothers of children up to 9 months of age (57 and 43 respectively) were interviewed. Baseline characteristics were similar in both groups.

Health related practices of mothers improved significantly in 4 out of the 52 items assessed. These areas were: partner support in FP, full vaccine coverage, breastfeeding duration, timing of first postnatal visit

Single child promotion practices (prenatal such as talking to the baby or caressing womb) and postnatal (reading, storytelling, presence of baby books) showed a positive trend of effect but did not reach significance as single items, although the combined child development score showed evidence of effect.

Authors' remarks

A four-day interactive training course on action-oriented home visits to pregnant women and infants produced a significant and sustained improvement of CHWs' KAP. Effects on self-referred practices of pregnant women and mothers living in areas served by CHWs belonging to intervention FHTs were limited, with very few items reaching statistical evidence of effect. The main limitations of the study was the fact that a direct observation of CHWs' practice proved to be impossible due to logistical and also ethical constraints, with the resulting bias implied in self referred rather than observed CHWs' practice, and the Type A bias produced by the limited sample of mothers who could be interviewed. Contamination between the two groups of mothers cannot be totally excluded considering the geographical proximity and could have reduced the difference between intervention and control.

Implementation process evaluation

Fidelity

Fidelity to the project proposal was respected and all components of the intervention were delivered accordingly to plans. All training sessions were held, the guide was delivered to all participants and included all issues addressed during the training.

Reach

The reach of the intervention was not fully achieved, but can still be considered successful. 40 CHWs, 8 nurses and 8 doctors were invited to attend the training; amongst them, participation was respectively of 77,5% (31 CHWs), 100% (8 nurses) and 37,5% (3 doctors). The guide was distributed only to attendees.

There were no negative reactions to training and all topics could be explored during the course.

Dose delivered and received, reaction to the intervention

All participants attended the training regularly, but three, who missed one or two half-day sessions. Researchers (partially coinciding with the trainers) observed that participants reacted more positively to active learning strategies (role play, small group activities and case discussion), and to learning activities linked to real cases experienced by them in practice. They also showed more interest in topics related to ECD as a theme almost completely new to them and as a topic taught by an international teacher.

ECD was also the theme which seemed to be most eagerly received, which required more time for discussing details and understanding rationale and practical suggestions, and was perceived as being new and innovative of their practice. The themes that were most quickly understood were related to breastfeeding, since participants were already familiar with the topic.

Recruitment

Recruitment was described to be more difficult than expected, since required several team meetings for sensitization of CHWs, for obtaining the support by District managers, for dealing with complex logistical aspects related to transport and meals,

and for dealing with the lack of any material incentive but the refreshments offered during the training.

Context

Researchers described their difficulties to access and obtain consent by the relevant health authorities for the work permits for CHWs, nurses and doctors. Additionally, researchers described that during the data collection period, there were major events that increased the difficulties of the trial implementation and, possibly, influenced the results. These were the epidemics of Zika in Pernambuco, which diverted resources and focus of public health authorities as well as of the population, particularly of pregnant mothers, and the political and economic crisis, which reduced abruptly the budgets of federal and local administrations, and increased the turn-over of local managers, such as District and members of the Municipal health services coordinating team (3 times during data collection).

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

IDENTIFICAÇÃO
Título do projeto: Visitas domiciliares intensivas e seus efeitos sobre conhecimentos, atitudes e práticas dos profissionais em saúde materno infantil: um estudo de intervenção

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Horários: segunda a sexta no horário de 7h às 11h30min (manhã) e 13h30min às 16h (tarde).

ORIENTAÇÕES
      O(A) senhor(a) está sendo convidado(a) a participar, de livre e espontânea vontade, do projeto de pesquisa intitulado "Visitas domiciliares intensivas e seus efeitos sobre conhecimentos, atitudes e práticas dos profissionais em saúde materno infantil: um estudo de intervenção", sob responsabilidade da pesquisadora Tereza Rebecca de Melo e Lima.

      Este termo de consentimento visa esclarecê-lo (a) sobre a pesquisa e garantir o seu direito à liberdade de consentimento e participação. Você receberá uma cópia deste termo de consentimento para seu registro.

INFORMAÇÕES SOBRE A PESQUISA
      A presente pesquisa tem como objetivo implementar e avaliar a efetividade de um treinamento específico de equipes de saúde da família para realização de um programa inovador de Visitas Domiciliares Intensivas (VDI) sobre boas práticas de saúde e suas implicações nos conhecimentos e práticas dos profissionais em saúde materno infantil.

      Será realizado nas Unidades de Saúde da Família geridas pela prefeitura do Recife e pelo Programa de Extensão Comunitária do IMIP (PEC-IMIP) durante o período de 2015 a 2018, após aprovação da pesquisa pelo Comitê de Ética do IMIP e Secretaria de Saúde.

      As equipes participantes serão divididas em 2 grupos: o grupo A, composto por equipes que participarão de um treinamento específico para realização das VDI e grupo B, denominado grupo controle que utilizará a abordagem atualmente recomendada e adotada pela Estratégia de Saúde da Família chamada nesse trabalho de visita domiciliar convencional (VDC).

      Antes do treinamento e 6, 12 e 18 meses após o treinamento, os profissionais serão convidados a preencher um questionário de avaliação dos conhecimentos, atitudes e práticas em saúde materno infantil, e serão acompanhados por um pesquisador treinado que vai observar a sua prática através de um checklist para avaliação do desempenho com base nas boas práticas de assistência à gestação, pós-parto e período pós-natal. Em seguida, o(a) senhor(a) será convidado a

participar de entrevistas de grupo para saber a sua opinião sobre o treinamento recebido e o desenvolvimento das visitas domiciliares.

DESCONFORTOS E RISCOS E BENEFÍCIOS

A metodologia adotada apresenta um risco mínimo aos participantes do estudo que consiste no tempo gasto durante o preenchimento dos questionários, observação das práticas e participação das entrevistas. O possível desconforto que poderá ser gerado seria o constrangimento por ser observado ou participar de discussões em grupo. Para amenizá-los, a observação será feita por pesquisador treinado, sem vínculo com a equipe, e usando os critérios de confidencialidade e participação voluntária do estudo.

A pesquisa visa adicionar um programa inovador de visitas domiciliares para melhoria da assistência à saúde materno infantil. As percepções dos participantes trarão críticas, sugestões de aperfeiçoamento do programa. Com a pesquisa você estará contribuindo para melhoria dos cuidados à gestantes e do desenvolvimento das crianças.

CONFIDENCIALIDADE, PARTICIPAÇÃO VOLUNTÁRIA E RETIRADA

As informações obtidas nesta pesquisa serão tratadas rigorosamente com sigilo. Os resultados serão divulgados publicamente, mas sua identidade não será revelada.

A sua participação nesta pesquisa é voluntária, você pode recusar-se a participar ou retirar seu consentimento em qualquer fase sem qualquer prejuízo.

DÚVIDAS

Se você tiver alguma consideração ou dúvidas sobre esta pesquisa, entre em contato com os pesquisadores responsáveis e o Comitê de Ética em Pesquisa em Serem Humanos do IMIP (CEP), que objetiva defender os interesses dos participantes, respeitando os seus direitos, e contribuir para o desenvolvimento da pesquisa, desde que atenda as condutas éticas. O endereço, contatos e horários de funcionamento do CEP-IMIP foram informados acima.

CONSENTIMENTO

Eu, _____, RG nº _____, declaro ter sido informado e concordo em participar, como voluntário, do projeto de pesquisa acima descrito.

_____   ___/___/___
Participante
_____   ___/___/___
Testemunha
_____   ___/___/___
Testemunha
_____   ___/___/___
Pesquisador Responsável

Impressão digita