

Profiles of Community Care Sites and provider Community Health Workers: A Case study at Gombe Matadi, Kenge and Kisantu Rural Health Zones in the Democratic Republic of Congo

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Abstract

Background: In sub-Saharan Africa, the DRC is one of the countries with high infant and child mortality. To solve this problem, the Ministry of Public Health has set up a new program: ICCM at the level of Community Care Sites managed by non-health professionals who are provider CHWs to serve Health Areas with difficult access. Since its implementation, there have not yet been many studies that concretely describe the functionality of CCS. To contribute to the extension of CCC in other Rural Health Zones, we conducted a study in 3 RHZ by choosing the Realistic Evaluation Approach to analyze the functionality of CCS in the DRC.

Methods: This is a cross-sectional study which is essentially a case study. Data were collected at the CCS level in these 3 RHZ chosen after multistage random sampling by mixed method (qualitative, quantitative). We used the following techniques: documentary review, direct observation at the CCS level, an in-depth interview with registered nurses and members of the health Zone management team and a survey using quantitative questionnaire with provider CHWs. The conceptual model that we developed is inspired by realist evaluation with an emphasis on Mechanisms. The relationship between the dependent variable (CCS functionality) and the independent variables was proven using Odds Ratio and Multiple Logistic Regression.

Results: CCS functionality and provider CHW profile were measured through the standards enacted for CCS implantation. At the significance level ($p=0.05$) has been in place for 3 years or more increases by 7 times chance that it is functional (OR = 6.7; $p = 0.000$). Has household been located less than 5 km from CCS increases by 4 times chance that the CCS is functional (OR = 7.04; $p = 0.034$). Has provider CHW is regularly trained and supervised increases by 10 times chance that the CCS is functional (OR = 10.01; $p = 0.031$). If provider CHW participate in Community cell animation meetings (OR = 4.34; $p = 0.009$) and CCS Management is done by CCS Management team increase by 4 times chance that this CCS is functional (OR = 3.6; $p = 0.002$). Finally, if there is an initiative for funding CCS increases by 8 times CCS functionality (OR = 8.69; $p = 0.009$).

Conclusion: CCS are functional in the 3 RHZs. Their organization, establishment and operation are directly linked to the provision of services to populations living mainly in health areas with difficult access, the availability of inputs of three ICCM-C diseases management, namely uncomplicated malaria, diarrhoea and pneumonia as well as building provider community health workers capacity to ensure their management. This study shows an effective contribution of provider CHWs on CCS functionality in health areas with difficult access.

Keywords: Community Care Sites functionality in the Democratic Republic of Congo with provider Community Health Workers involvement

1. Introduction

Although the global decline in the annual number of infant deaths from 1990 to 2013 is encouraging, this reduction was slow to emerge before stagnating and sometimes even reversing in many countries around the world, including India, China, Pakistan, Indonesia and particularly in sub-Saharan Africa (UNICEF, 2014). Currently, ten countries with the highest infant and child mortality rates are all in sub-Saharan Africa where most deaths of children under five are from preventable and treatable causes (Wang et al., 2014). Indeed, in 2013, malaria, diarrhea and pneumonia accounted for 1.3 million (or 40%) of deaths on children under five in sub-Saharan Africa (UNICEF, WHO, 2014). Among those ten countries, DRC is one of the first 5 followed by Nigeria and Uganda to hold the highest infant and child mortality. Malaria is responsible for more than 400,000 deaths per year, most of which are children under five and pregnant women (WHO: WMR, 2016). In the DRC, 31% of children suffer from malaria and 19% die before their 5th birthday (DHS 2013-2014).

According to a study conducted in Africa in 2009 on 6,000 children suffering from severe malaria at the community level, about 23% reached a referral health facility between 6 to 15 hours of walking and 22% had still not arrived after more than 15 hours of walking (Clinton Health Access Initiative, 2009). One of the strategies to control these diseases is the Integrated Childhood Illnesses Case Management at the Community Level (ICCM-C) which is a strategy based on the principle of equity which aims to improve the access to essential services for children that goes beyond the reach of health care facilities (Organisation mondiale de la Santé, 2017). In 2012, through a joint statement, UNICEF and WHO supported the IMCI-C strategy with the aim of training, equipping and supervising community health workers (CHWs) to enable them to treat children for malaria (in malaria-affected countries), diarrhea and pneumonia using artemisinin combination therapy (ACT), oral rehydration salts (ORS), zinc tablets and oral antibiotics (Young, Wolfheim, Marsh, & Hammamy, 2012).

ICCM-C strategy uses organization, establishment and operation of Community Care Sites in rural areas with difficult access (Ministère de la Santé Publique Août, 2015).

The Community Care Site is a space located in a house that covers a locality or one or more villages within which households located more than 5 km walk from a Health Center (HC) or separated following a natural barrier have access to first aid before referral to a HC or home care monitoring offered to children under five years of age by a Provider Community Health Workers (PCHW). (Ministère de la Santé Publique, 2016)

The PCHW is a community health worker of the village and not a health professional who is given training on symptoms management of the following ICCM-C diseases: uncomplicated malaria, diarrhoea and pneumonia. (Ministère de la Santé Publique, Ibidem)

In 2017, 6,789 community care sites were identified and are operational in 402 HZs out of the 516 in the DRC. Actually, in the DRC, out of the 516 HZs 404 HZs have CCS (78%). (PNECHOL-MD Annual Report 2019).

The Global strategy on human resources for health to 2030 (resolution WHA69.19 (2016) presents a series of strategic options to maximize the benefits that States member could derive from investing in human resources for health.

This means that in many countries community health workers are part of the interdisciplinary workforce. They have specific roles in primary health care and essential public health functions. The Global Strategy recognizes that community health workers and other categories of health personnel working at this level are effective in delivering a range of preventive, curative and promotional services, and they can contribute to reducing health inequalities and optimize health care access. (OMS, 2014)

The 2018 Astana Declaration outlines the desire to effectively address current and future health challenges by mobilizing all stakeholders, including health professionals, academic institutions, community health workers and patients. (WHO, UNICEF, 2018a)

After a study carried out in Mosango Rural Health Zone, promotional Community Health workers contributed to the improvement of health indicators. (Mukulukulu et al., 2020)

From this group of promotional CHWs, some were recruited as Provider Community Health workers (PCHWs) to manage the Community Care Sites (CCS). It is the same in Gombe Matadi, Kenge and Kisantu RHZs.

If promotional CHWs have indeed contributed to improve health indicators in Mosango RHZ, our study hypothesis is that provider CHWs contribution on CCS functionality is effective in the health area with difficult access.

To this end, this study will answer the main question of knowing: What is the level of Community care sites functionality in the DRC, mainly in health areas with difficult access?

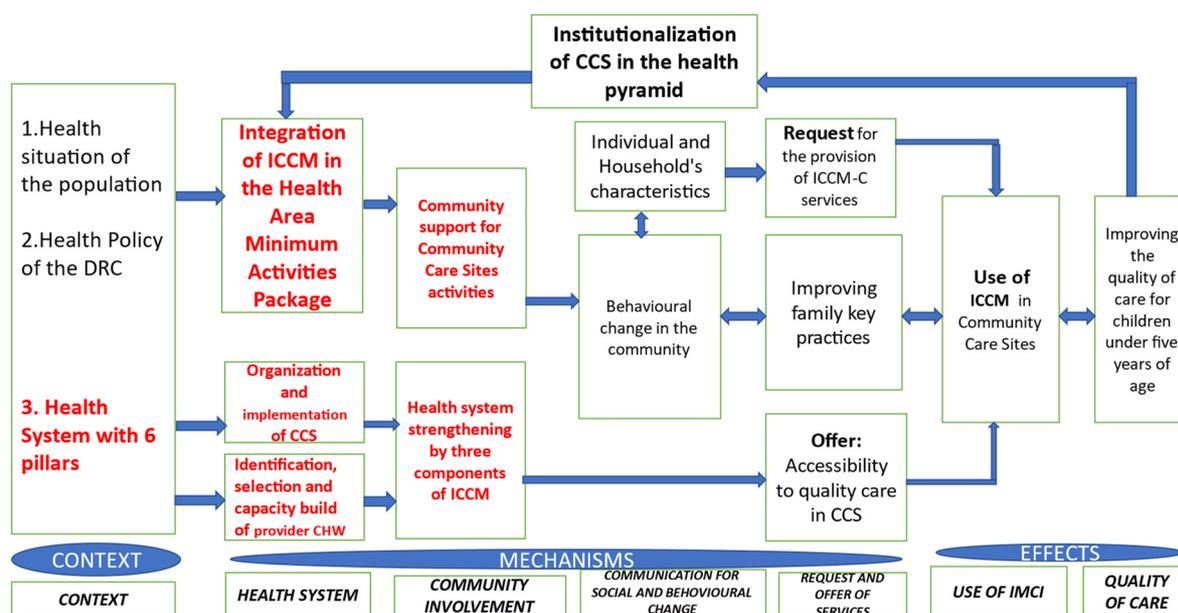
To achieve this, we conducted a mixed method study (qualitative and quantitative) in 3 RHZs from 2018 to 2019 based on the Realist Evaluation approach which is once model of the Theory of change (TOC) takes into account the Context - Mechanisms - Effects. By looking at CCS functionality, we focus on the main Mechanisms that make up our conceptual framework model. (Etshumba et al., 2019)

2. Objectives

This study general objective is to contribute to the extension of CCS coverage to all health zones in the DRC. The main objective functionality of CCS has inside: (i) conditions to set up a CCS; (ii) operational capacity and (iii) provider CHWs profile.

To achieve the objectives mentioned above, we used a conceptual framework model adapted from PAWSON and Tilley model in order to explain the succession of different mechanisms that interact to make CCS functional in different Health Areas (HA) with difficult access in **Figure 1** as follow:

Conceptual framework model to evaluate functionality of CCS and provider CHWs profil in the DRC



Adapted from PAWSON and TILLEY model (Pawson & Tilley, 1997).

Figure 1. Conceptual framework model to evaluate CCS functionality and provider CHWs profile in DRC

It should be emphasized here that in this conceptual framework model, our study only dealt with the **Mechanisms** part and more precisely the actions highlighted in red, particularly the human resources involved, in order to see how these different mechanisms, starting from CCS organization, establishment and operation have been organized in the 3 RHZs mentioned above. The Context is represented by the 6 pillars of the health system (Ministère de la Santé Publique, n.d.).

However, DRC health policy has integrated the ICCM CMAP into the MAP of HZs. This resulted in the identification and selection of provider CHWs among the promotional CHWs, capacity building, official installation of CCS and the provision of inputs to organize the 3 ICCM CMAP interventions management.

Once all these conditions have been met, the implementation of activities of the ICCM CMAP with the support of Technical and Financial Partners (TFP) through community sensitization by promotional CHWs aimed at behavior change in the community through social and behavior change communication. This sensitization also aimed at the involvement of communities in activities of the CCS through the orientation of children and the active participation in the meetings of the Community Animation Cell (CAC) and the CCS Management Committee (CMC) in the HA where they are located.

3. Methodology

3.1 Study Sites Description

Gombe Matadi RHZ is located in the Kongo Central Province. It had an estimated population of 101.855 inhabitants in 2018 spread over an area of 4.778 km² and a density of 21 inhabitants per km². It has 15 HA and all 15 each have an CCS, 15 CCCs, 15 HC and 1 General Reference Hospital (GRH). The furthest CCS from the HZCO is 146 km and 17 km from the nearest HC (CCS Luwanda in Kinkoni HA). All 15 CCCs are geographically inaccessible has the particularity of the poor condition of the roads. Several natural obstacles including rivers with sometimes non-existent or poorly built bridges, ravines, the only means of access being either the motorbike or the canoe in 90 % of CCCs visited.

Kenge RHZ is located in Kwango Province and had an estimated population of 306.488 inhabitants in 2018 spread over an area of 5.558 km² and a density of 55 inhabitants per km².

It has 29 HA, including 13 with CCS, 29 HC and 1 RGH. The furthest CCS from the HZCO is 159 km and 33 km from the nearest HC (CCS Kitanda in Boko HA). Geographical inaccessibility is characterized particularly by the presence of 4 large rivers in the 4 cardinal points namely Wamba, Inzia, Gobari and Boko as well as the poor state of roads.

Kisantu RHZ is located in the Kongo Central Province. It had an estimated population of 196.554 inhabitants in 2018 spread over an area of 3.968 km² and a density of 49 inhabitants per km².

It has 17 HA, including 12 with CCS, 17 HC, 1 RHC and 1 RGH.

The farthest CCS from the HZCO is 157 Km and 24 Km from the nearest HC (CCS Lemfu in Lemfu HA). Geographical inaccessibility is characterized by several natural barriers: Inkisi and Boko rivers, Congo River, poor road conditions and ravines.

3.2 Study Design

This is a cross-sectional study carried out in Gombe Matadi, Kenge and Kisantu RHZs for 2 years, from 2018 to 2019. The study combined a mixed method (qualitative and quantitative).

3.3 Study Population

Our study includes two study populations. For the first and two specific objectives, the study population is made up of all CCS, a total of 36 CCCs for the 3 RHZs. Provider CHWs were the study population from the third specific objective, we investigated a total of 72 provider CHWs.

To choose our study populations, we used multistage sampling:

- 1st degree: Province
- 2nd degree: Rural Health Zone
- 3rd degree: Health Area
- 4th degree: Community Care Sites with all Provider Community Health Workers.

3.4 Data Collection

Data was collected through the following techniques from two study populations: direct observation for CCS and interview for provider CHW. Documentary review, in-depth interview with registered nurses and HZ Management Team members using an interview guide and a survey using a quantitative questionnaire with provider CHWs were also used.

A total of 30 registered nurses and 9 members of the HZMT were interviewed and a quantitative questionnaire was administered to 72 provider CHWs.

For all people interviewed, we had previously obtained the signature of an informed consent form.

3.5 Variables Definition and Analysis

The dependent variable for this study is the CCS functionality. This functionality is measured through the standards enacted for the implementation of CCCs, their operating capacities and provider CHWs profile that manage them.

Thus, our study has two statistical units: CCS and provider CHWs.

Two indicators were measured to identify CCS functionality: (i) the % of CCCs whose implementation is justified in accordance with the standards and (ii) the % of provider CHWs meeting the typical profile of a good provider

CHWs.

Thus, with these variables, 4 criteria were taken into account for this analysis:

Containing: CCS geographical location with distance between the CCS and the HC of the HA, the village population with difficult access covered by the CCS; CCS physical condition in relation to its interior and exterior appearance.

Content: the technical platform related to the ICCM-C MAP (Kit or equipment, inputs), the existence of CCS subsidy.

Operation: CCS conditions of implementation (origin of its creation), provider CHWs volume of work, schedule of activities and data reporting.

Provider CHWs qualification: Sociodemographic profile (profession, marital status, sex, level of education, etc.), specific training of provider CHWs.

The qualitative data were analyzed manually on an empirical basis by identifying the main themes sought through the hypothetico-deductive approach by pinning down the significant statements.

Quantitative data from provider CHWs survey were codified and recorded using CPro-7 software and then exported to SPSS 23.0 and Stata S-64 software for analysis.

These data were summarized in the form of proportions for categorical variables and in form of means and standard deviation for numerical variables.

To verify that data from this study followed a normal distribution and there is a correlation between independent variables with dependent variable 2 tests were used: (i) The Multi collinearity test for all dependent variables which don't show multi collinearity because the VIF was less than 10 with a mean VIF < 1; (ii) The Breusch-Pagan heteroscedasticity test which don't show heteroscedasticity in relation to the Chi-square value and the threshold of $p < 0.000$. The model was well fitted because the area under the ROC curve was large (Area under ROC curve < 1).

The association between categorical variables was tested using Wald's Chi-square test, Odds Ratio and Fisher's exact test.

A multiple logistic regression model using the top-down step-by-step approach was used to identify the explanatory factors of the dependent variable.

The statistical significance threshold was set at $p = 0.05$.

The independent variables selected for the logistic regression model were selected according to their significant values with respect to the significance level and the inclusion in the confidence interval. They include socio-demographic characteristics of provider CHWs as well as characteristics of services offered at the CCS level. They are essentially the following: (i) The CCS has been established for more than 3 years; (ii) households are less than 5 km walk from the CCS; (iii) the CCS is supported by an NGO or technical and financial partners; (iv) the provider CHW is trained and advised by community members on the CCS functioning during formal CAC meetings with community leaders and after the care of sick children; (v) provider CHW provides advice to parents on the application of key family practices followed by home visits.

The Summary of methodology is presented in the **Table 1** below as follow:

Table 1. Methodology of the manuscript Profiles of CCS and provider CHWs in the DRC

Specific Objectives	Method	Study Population	Dependent Variable	Outcome Measurement Indicators	Data Source	Sampling	Data Collection Techniques
Describe The Main Community Care Site Functionality Have Inside: Conditions To Set Up A Community Care Site And Operational Capacity	Qualitative	Community Care Sites	Community Care Site Functionality	% Of Ccss Whose Implementation Is Justified In Accordance With Standards	Mapping Of Health Areas; Health Center Nis And Dhis2 Report; Ccs Implementation Report, Ccs Activities Report, Key Informant Interview Questionnaire	Multistage Sampling	Direct Observation; Documentary Review In-Depth Informant Interview Key
Determine Provider Community Health Workers Profile In Relation To Their Socio-Demographic Characteristics And Specific Training	Quantitative	Provider Community Health Workers		% Of Provider Chws Meeting The Typical Profile Of A Good Provider Chws	Provider Chws Interview Questionnaire	Systematic	Interview; Provider Chws Survey Using A Questionnaire

4. Results

4.1 Community Care Sites Implementation

All 36 CCCs visited location in the 3 RHZs was dictated by the following criteria: (i) the distance between the CCS and the HC of the HA, (ii) the coverage of villages population with difficult access by the CCS, (iii) the existence of premises to house the CCS, (iv) the availability of inputs and subsidies, as well as that provider CHWs work there.

In addition, these 3 RHZs have major problems in common: geographical inaccessibility in most of HA, existence of several natural barriers as well as the very advanced state of disrepair of road infrastructures.

Conditions for setting up Community Care Sites are summary in the **Table 2** as follow:

Table 2. Conditions for setting up Community Care Sites

	Health Zones				Observation
	Gombe Matadi	Kenge	Kisantu	Total	
Distance from households					
Less than 5 km	100,0	100,0	100,0	100,0	36
More than 5 km	0,0	0,0	0,0	0,0	0
Existence duration					
1-2 years	0,0	0,0	0,0	0,0	0
3 years and over	100,0	100,0	100,0	100,0	36
Distance with Health C					
15-20 Km	40,0	50,0	30,0	40,0	14
More than 20 Km	60,0	50,0	70,0	60,0	22
Availability of inputs					
Yes	100,0	100,0	100,0	100,0	36
No	0,0	0,0	0,0	0,0	0
Conservation of inputs					
Good	90,0	80,0	80,0	87,0	31
Bad	10,0	20,0	20,0	13,0	5
Existence of a local					
Yes	100,0	100,0	100,0	100,0	36
No	0,0	0,0	0,0	0,0	0

Comment:

This table shows that all CCS (100%) are located less than 5 km from households, established for more than 3 years and have appropriate premises with the necessary inputs for children care. 60% of them were located more than 20 km from the HA HC against 40% between 15 and 20 km.

In 95% CCS, the CCS local belongs to the provider CHW against only 5% CCS was in the residence of the village chief. 80% of CCSs were built in rammed earth and 20% in semi-durable; 95% of CCSs had a cabinet with a padlock for storing drugs, working tools and other inputs.

The provider CHW choice met the following criteria: be a member of the village with irreproachable morality, have a minimum education level of complete secondary school, be trained in ICCM, have inputs for IMCI-C diseases management, be regularly supervised by RN and actively participate in CAC and HADC activities.

Households' location of healthcare sought is summary in the **Table 3** as follow:

Table 3. Location of healthcare sought by households by health zone

Location of healthcare sought	Health Zones			
	Gombe Matadi	Kenge	Kisantu	Total
CCS	91,87	92,98	81,08	89,38
Health Center	4,07	3,51	18,02	7,65
Traditional healers	4,07	3,51	0,90	2,97
Total	100,00	100,00	100,00	100,00
Observation	200	200	200	600

Comment:

The Table 3 above shows us that regardless of the health zone, those responsible for children under 5 years of age use treatment sites in rural areas with difficult access. To this end, 89.38% of household heads use community care sites when the child is sick. However, a small proportion of parents still use traditional healers 3%. The health center being the second resort after having attended the CCS around 8%.

4.2 CCS Operating Capabilities

Compared with operating capabilities, it appears that from organizational point of view 100% of provider CHWs were above all promotional CHWs. Compared to the establishment, 95% of CCS premises belonged to provider CHWs; As for operation, 100% of CCCs had a ICCM Kit, 80% incinerated waste but 27% had experienced a stock shortage of inputs in 3 months preceding the survey. Regarding the management of the CCS, 100% had management tools, 80% of which were up to date and 100% of which were managed by Community care site management committee.

Thus, CCS operating capabilities are summary in the **Table 4** as follow:

Table 4. Assessment of CCS operating capacities

N°	FONCTIONAL STANDARDS	FINDING
1	CCS establishment: CCS establishment begins during a HADC meeting with the identification of provider CHWs by the HZTM members as well as the RN and the Village Chief among the community leaders (promotional CHWs) with the following criteria: being a member of the village, having moral probity, having at least a state diploma: having completed the complete secondary school cycle, having a professional occupation, having a room for CCS and having the time to take care of CCS. The count of children under 5 in villages dependent on the CCS and the strengthening of provider CHWs capacities for 3 IMCI-C diseases management.	-In all CCS, 100%, provider CHWs were above all promotional members of the village chosen during HADC meetings and had benefited from capacity building in IMCI-C MAP. - Among them 92% had a complete secondary education level against 8% of the complete primary level.
2	Installation / CCS official opening: CCS is officially installed during a meeting which all members of the Village. They are summoned to the residence of the Village Chief who presents provider CHWs, gives them all documents and inputs and presents the premises to CCS house in the presence of the RN and sometimes HZT members and ends with their official installation followed by a small cocktail.	In all CCS visited, for 95%, CCS premises belong to the provider CHWs only 5% are in the residence of the Village Chief (2 CCSs of which one of the providers CHW was the daughter of the village chief in the Kenge HZ).
3	Inputs: Immediately after the official installation, provider CHW checks and fills in the management tools and begins the actual treatment according to the algorithms made available to it for the 3 diseases. The inputs are kept in a cabinet with a padlock and the CCS have receptacles for storing waste. At the beginning of the following month, after supervision by RN, provider CHW receives a flat rate for his bonus.	-100% of CCSs had a cabinet for storing all inputs -100% of CCSs were supplied quarterly with medicines and other inputs from the RN of the HC after supervision of medicines management -27% of CCCs had experienced a stock-out of inputs in the 3 months preceding the survey -80% incinerate the waste then bury it in a hole a few meters from the CCS in the bush. -70% had a bicycle in good condition for monitoring home visits for children treated -70% of provider CHWs had received their bonus
4	Working tools: Case management kit, consultation register, case management algorithms, referral note for cases to the HC, supervision register, register for holding CAC and DHAC meetings	100% of CCSs visited had management tools. Only 80% of them had all the management tools up to date.
5	Management bodies: CCS is managed by the CMC composed of a few members of the previously chosen village (5) who meet once a month, in	100% of CCSs are managed by CMC, but the frequency of meetings was based on the

turn, report to the CAC and to the RN. Minutes of meetings are countersigned by all members and archived.

availability of all members. With an average of 80% holding of CMC meetings.

However, it should be noted that at the time of our investigation, Gombe Matadi HZ had HADC but had not yet set up the CACs in all HA. Only the Kenge and Kisantu HZs already had them and were operational.

Case Management Assessment Criteria

Concretely during our visit to some CCS, the process of taking care of a child presenting one or more symptoms of one of 3 ICCM diseases is as follow in the Table 5:

Table 5. Case management assessment criteria

B	Welcome
O	
S	Symptoms assessment and child weighing
A	“Anamnesis” depending on the case plus paraclinical examination (RDT) if suspicion of uncomplicated malaria
N	
T	Treatment administration according to the algorithm
E	Evaluation through the home visit

Case management Algorithms at CCS level:

- If fever, take capillary blood to do the RDT, if positive, T3 with paracetamol and ACT then follow-up of the home visit, if no improvement refers to the HC with an orientation note
- If diarrhoea, administer ORS plus ZINC followed by home visit, if no improvement refers to HC
- If cough with rapid breathing, administer Antitussive plus Amoxicillin Co followed by home visit, if no improvement refers to HC.

He regularly benefits from supervision visits from the RN to whom he reports through the transmission of his monthly report which includes: cases treated number by age and by pathology, drugs and waste management and the HC-oriented cases number.

We noted that in Gombe Matadi and Kisantu HZs, the integration of the complete package of ICCM interventions at the CCS level was progressive: the first year the fight against uncomplicated malaria, the second year the 2 other interventions (fight against diarrhea and ARI).

Community care sites operating conditions are summary in the **Table 6** as follow:

Table 6. Community Care Sites operating conditions

	Health Zones				Observation
	Gombe Matadi	Kenge	Kisantu	Total	
Existence of support					
Yes	100,0	100,0	100,0	100,0	36
No	0,0	0,0	0,0	0,0	0
Number of p CHWs					
2	100,0	100,0	100,0	100,0	36
1	0,0	0,0	0,0	0,0	0
Volume of work					
CCS fonct 7days a week	100,0	100,0	100,0	100,0	36
Less than 7 days	0,0	0,0	0,0	0,0	0
Existence of 3 IMCI interventions					
Yes	100,0	100,0	100,0	100,0	36
No	0,0	0,0	0,0	0,0	0
Care cost					
Free	100,0	100,0	100,0	100,0	36
Paid	0,0	0,0	0,0	0,0	0
Existence algorithms					
Yes	100,0	100,0	100,0	100,0	36
No	0,0	0,0	0,0	0,0	0
Medicines supply					
Registered Nurse	100,0	76,0	100,0	92,0	33
HZCO or Partner	0	24,0	0,0	8,0	3
Out of stock medicines					
Yes	30,0	30,0	20,0	27,0	10
No	70,0	70,0	80,0	73,0	26
Waste management					
Yes	100,0	100,0	100,0	100,0	36
No	0,0	0,0	0,0	0,0	0
CCS Supervision					
Yes	80,0	100,0	80,0	87,0	31
No	20,0	0,0	20,0	13,0	5
CCS Mangement					
CMC	80,0	100,0	70,0	83,0	30
State	0,0	0,0	0,0	0,0	0
Partner	20,0	0,0	30,0	17,0	6
Other	0,0	0,0	0,0	0,0	0
Total					36

Comment:

It appears from the Table 6 above that with regard to the organization, implementation, operation and management,

all CCSs visited are 100% compliant with standards: they have been established for more than 3 years, there is support at the CCS, households are located less than 5 km walk from the CCS, 2 provider CHWs recruited by the community trained in ICCM work there every day of the week and benefit from motivation and free access to care with the use of case management algorithms.

Nevertheless, 27% of CCSs, declared having had a stock-out of inputs in the 3 months preceding the survey, 83% of CCSs are managed by CMC and 87% of them benefited from at least one supervision visit either of the RN or HZT members and the TFPs.

Provider CHWs sociodemographic characteristics and assessment of the effectiveness of their work are summary in **Tables 7 and 8** as follow:

Table 7. Sociodemographic characteristics of Provider CHWs

	Health Zones				Observation
	Gombe Matadi	Kenge	Kisantu	Total	
Sex					
Male	76,9	75,0	81,8	77,8	56
Female	23,1	25,0	18,2	22,2	16
Age group					
Under 45 years	65,4	54,2	59,1	59,7	43
45 years and over	34,6	45,8	40,9	40,3	29
Educational level					
Complete primary	3,9	12,5	9,1	8,3	6
Complete secondary	96,1	87,5	90,9	91,7	66
Occupation					
Teacher	51,4	52,0	50,4	51,2	37
Farmer	48,6	48,0	49,6	48,8	35
Marital status					
Married	88,4	91,0	92,0	90,5	65
Single people	11,6	9,0	8,0	9,5	7
CHWs recruitment					
Community	100,0	100,0	100,0	100,0	72
Registered Nurse	0,0	0,0	0,0	0,0	0
CHWs capacity build IMCI					
Yes	100,0	100,0	100,0	100,0	72
No	0,0	0,0	0,0	0,0	0
Motivation of p CHWs					
Yes	100,0	100,0	100,0	100,0	72
No	0,0	0,0	0,0	0,0	0
Religion					
Catholic	15,5	67,0	68,5	50,3	36
Protestant	20,0	19,8	20,5	20,1	15
Kimbanguists	64,0	12,0	10,0	27,0	19
Revival church	0,5	1,2	1,0	0,6	2
Total					72

Comment:

It appears from the table above that among provider CHWs surveyed are more men (77.8%) than women (22.2%). The majority of provider CHWs surveyed are in the age group of less than 45 years (59.7%) with an average age of 30 years and followed by that of 45 years and over (40.3%). They have almost a complete secondary education level (91.7%) followed by those of complete primary level (8.3%). These global trends were also observed in all the study health zones. Regarding professional occupation, all provider CHWs surveyed, in addition to being CHWs, have a professional occupation: 55.7% teachers and the rest other professions mainly farmers 44.3%. This trend remains the same in Kenge and Kisantu health zones. Overall, almost all them were married 90% against 10% of single people. With regard to religion, almost half are Catholic 50%, except in Gombe Matadi HZ where 64% are Kimbanguists (the proximity to the Kimbanguists Church of Nkamba).

Table 8. Assessment of provider CHWs on the effectiveness of their work

N ^o	INDICATORS	Yes (%)	No (%)
1	Training received as promotional CHWs	100,0	0,0
2	Knowledge on promotional activities	86,7	13,3
3	Promotion of key family practices	85,6	14,4
4	Promotion of vaccination, LLINs and birth registration	84,7	15,3
5	Overall score on practices in accordance with IMCI-C MAP	90,0	10,0
6	Knowledge of uncomplicated malaria, diarrhea and ARI management	92,8	7,2
7	Home visits set up	93,0	7,0
8	Knowledge of stock shortages of inputs	27,0	73,0
9	Waste management	100,0	0,0
10	Data reporting	100,0	0,0
11	CCS supervision	82,0	18,0

Comment:

Overall, all provider CHWs interviewed acknowledged (being primarily promotional CHWs) that they had received basic CHWs training, 100.0%. While 86.7% of them have good knowledge of promotional activities, their overall score on practices in accordance with the ICCM MAP is 90.0%. This level also justifies the fact that only 92.8% of provider CHWs have a good knowledge of the management of uncomplicated malaria, diarrhea and ARI. This is justified by the fact that only at Kenge HZ all 3 interventions were implemented at the same time (having served as a pilot HZ); in the 2 HZs (Gombe Matadi and Kisantu) we started with the implementation of the fight against uncomplicated malaria then the 2 other interventions followed 2 years later.

However, compared to the indicators of a few flagship activities of the ICCM-C MAP, including home visits to households, promotion of key family practices, waste management, data reporting and supervision of CHWs either by RN or other HZT members show an increasing trend, but 27% of provider CHWs reported experiencing a stock-out of inputs in the 3 months prior to the survey.

To improve community participation, indicators are summary in **Table 9** as follow:

Table 9. Evolution of 2 community involvement indicators

HEALTH ZONES	Indicator	Base line	Obs Val 2017	Obs Val 2018	Obs Val 2019
GOMBE MATADI	Holding of HADC	50%	62%	90%	93%
	Rate of implementation HADC decisions	30%	67%	75%	80%
KENGE	Holding of HADC	50%	90%	85%	80%
	Rate of implementation HADC decisions	30%	90%	80%	84%
KISANTU	Holding of HADC	50%	96%	97%	99%
	Rate of implementation HADC decisions	30%	93%	90%	90%

Source: Activity report, DHIS2 data from 3 RHZs.

Comment:

This table shows a significant improvement in the holding and implementation of the decisions taken by the community involvement bodies. This demonstrates a strong community involvement in the implementation of the CMAP at the CCS level.

Then, Community care sites functionality explanatory factors are summary in **Table 10** as follow:

Table 10. Community Care Sites Functionality explanatory factors

Independent Variables	Modalities of variable	Chi-square	Odds Ratio	Standard deviation	p	Confidence interval
CCS uptime	1-2 years	47,19***	Réf			
	3 years and over		6,73***	12,81	0,000	[3,29 ; 13,79]
Distance between CCS and household's	More than 5 km	2,70	Réf			
	5 Km or less		7,04**	0,83	0,034	[0,05 ; 0,14]
Out of stock of IMCI inputs	No break	2,68	Ref			
	More than a week		2,96**	0,28	0,039	[0,04 ; 0,15]
CCS management	NGO and Partner	8,78**	Réf			
	State		1,10	0,59	0,855	[0,38 ; 3,19]
	CMC		3,64**	1,54	0,002	[1,59 ; 8,36]
CCS supervision	No supervision	13,05***	Ref			
	Regular supervision in the last 3 months		10,01***	0,13	0,031	[0,02 ; 0,82]
Method for collecting the Community's opinion on the CCS functioning	Formal meeting with community leaders	12,12**	Réf			
	Suggestion box		3,27**	1,87	0,038	[1,07 ; 10,03]
	CAC meeting		4,34**	2,47	0,009	[1,45 ; 13,00]
Provider CHW advice to parents on key family practices and home visit	Advised and visited	12,26***	Réf			
	Did not advise and visited		0,40**	0,12	0,000	[0,22 ; 0,75]
% of those who think there is a CCS fundraising initiative	10 – 30 %	16,18***	Réf			
	31 – 50 %		3,54**	1,88	0,037	[1,08 ; 10,04]
	More than 51%		8,69***	4,69	0,009	[1,54 ; 12,00]
Constant			0,40***	71,23	0,051	[0,003 ; 0,15]

Comment:

This table shows us that at the significance level ($p=0.05$) has been in place for 3 years or more increases by 7 times chance that it is functional ($OR = 6.7$; $p = 0.000$). Has household been located less than 5 km from the CCS increases by 4 times chance that the CCS is functional ($OR = 7.04$; $p = 0.034$). Has provider CHW is regularly trained and supervised increases by 10 times chance that the CCS is functional ($OR = 10.01$; $p = 0.031$). Provider CHW participation in CAC meetings ($OR = 4.34$; $p = 0.009$) and CCS Management Team leads the management of CCS increase by 4 times chance that this CCS is functional ($OR = 3.6$; $p = 0.002$). Finally, if there is an initiative for funding CCS increases by 8 times CCS functionality ($OR = 8.69$; $p = 0.009$).

5. Discussion

The functionality of CCS is dictated by three determinants: (i) the establishment of CCS linked mainly to serving populations living in rural areas in HA with difficult access, the availability of premises to house CCS, community

involvement during the official installation of CCS; (ii) the operation of CCS is linked to the choice of provider CHW by the community among the promotional CHWs, its capacity building in ICCM-C, the availability of inputs to organize care of children under 5 years old; (iii) the profile of CCS is dictated by the following criteria: being a member of the village and promotional CHW, having a level of education of at least complete secondary school, being of good moral character and available to take charge of children under 5 years old presenting one or more symptoms of one of 3 ICCM-C diseases.

This study follows the first 2 during which we laid the foundations for using the realist approach to assess the effectiveness of ICCM at CCS level. (Mukulukulu et al., 2020; Etshumba et al., 2019). It allowed us to analyze the profiles of CCSs and the human resources working there (provider CHWs) on the basis of the results obtained through a mixed approach (qualitative and quantitative). The conceptual model framework of the realistic evaluation approach of PAWSON and TILLEY (Pawson & Tilley, 1997) served as a basis for this analysis based on the pillars of the health system to justify the importance of put in place mechanisms to support the 3 components of ICCM and promote the accessibility of populations living in hard-to-reach environments to benefit from quality health care.

To achieve the three specific objectives of this study, we firstly analyzed the operating capacities of CCSs to deliver quality health care and services, and secondly determined the profile of provider CHWs who are responsible for the CCS management. The combination of the good CCS capacities which are organized according to the enacted standards and a good profile of their leaders allowed us to envisage a good level of CCS functionality established in the three RHZs selected for this study. This optimistic perspective makes it possible to effectively consider the extension of CCSs in other HZs not yet covered by these community structures which provide access to quality care for marginalized and hard-to-reach populations in the DRC (Ministère de la Santé Publique Octobre, 2022).

5.1 Operating in Accordance with Standards

All CCSs visited (100%), are operating in accordance with standards. This is confirmed in a study carried out in 2018 which presents similar results showing that 80% of the CCSs were functional after taking into account the following criteria: population coverage of villages with difficulty accessible, the CCS proximity with households to less than an hour's walk as well as the availability of ICCM-C and provider CHWs inputs (Ministère de la Santé Publique/République Démocratique du Congo, 2016).

5.2 Provider CHWs Socio Demographic Characteristics

Provider CHWs surveyed are more men (77.8%) than women (22.2%). Almost surveyed are in the age group of less than 45 years (59.7%) with an average age of 30 years and followed by that of 45 years and over (40.3%). Provider CHWs surveyed have almost a full secondary education level either (91.7%) followed by those with a full primary level or (8.3%), in addition to being provider CHWs, all have a professional occupation either teacher or farmer; these results have been demonstrated by the DHS 2 which indicates that in the DRC 47% of adults have a level of secondary education, also the study conducted by Kadiri Mohammed and Wafae in Morocco in 2017 with 51%. (Kinshasa School of Public Health, University of Kinshasa (KSPH) et ICF, 2019; Kadir & Wafae, 2017; Kok et al., 2015; Roberton et al., 2015; Kangovi & Asch, 2018; Amouzou et al., 2016).

5.3 Training of provider CHWs

98% provider CHWs were trained in ICCM-C, this corroborates with USAID's final report published in 2014 on the evaluation of cases management of uncomplicated malaria in the districts of Gahombo, Gashoho and Mabahi in Burundi with 67% of provider CHWs trained. In 2017 in Morocco, the study insists on the fact that this training made it possible to equip 62% of provider CHWs with the skills necessary to carry out certain universal coverage strategies through the census of beneficiaries as well as local communication for behavior change. (USAID, 2014; UNICEF, 2015; Cometto et al., 2018)

However, the risk of abandonment of provider CHWs and indeed CHWs in general is very high in the DRC environment. Motivation issues are often at the root of these abandonments which require regular renewal of their training. (African Leaders Malaria Alliance, 2016)

5.4 Practice of ICCM

Compared to the practice of ICCM MAP activities, 90% of provider CHWs do it correctly. WHO emphasizes that CHWs are an integral part of an interdisciplinary workforce, they have particular roles in primary health care and the essential public health function. The global strategy recognized that CHWs and other categories of CHWs working at this level are effective in providing a range of preventive, curative and promotional services and can help reduce inequities to care access. (WHO, 2019)

5.5 Supervision of Provider CHWs

As for the supervision component; 98% of provider CHWs surveyed were trained in ICCM-C, of which 90% said they had received a supervision visit in the month preceding the survey. In 2017, a study conducted in Mozambique also demonstrated that regularly trained and supervised provider community health workers, regardless of their level of education, are able to ensure adequate first aid in their communities and provide the necessary services to hard-to-reach populations. They are confident in their abilities and are highly valued by the communities they serve and most of them are motivated to continue as volunteers without receiving regular compensation. (Guenther et al., 2017)

In 2012, WHO and UNICEF issued a joint evidence-based statement that considers the use of ICCM-C by community health workers as an equity strategy to improve access to essential care children under 5 years old. Community health workers represent an effective investment solution to strengthen primary health care. (OMS, UNICEF, 2012)

5.6 Availability of Inputs

Compared to the availability of inputs at the care recourse place, 80% of CCS visited had inputs for the management of 3 ICCM diseases.

A recent CCS Implementation Assessment Report conducted in 2022 by the Clinton Health Access Initiative with support of USAID, SANRU and PNECHOL-MD highlighted the key role of the three ICCM diseases management at the CCS level in the DRC which led to the development of the Plan for CCS extension in all of 112 DRC HZs (WHO, UNICEF, 2018b; Hatefi, 2017; UNICEF, 2017; ASH, 2016; Ferrer et al., 2016).

6. Conclusion

Community care sites are functional in the 3 RHZs. Their organization, establishment and operation are directly linked to the provision of services to populations living mainly in HA with difficult access, the availability of inputs for three ICCM-C diseases management namely uncomplicated malaria, diarrhea and pneumonia as well as the capacity building of provider Community Health Workers to ensure their management.

Provider Community Health Workers are first and foremost the promotional CHWs where, in addition to performing their tasks related to health promotion activities, they were able to organize the three ICCM-C interventions management in CCS level. This study shows an effective contribution of provider CHWs on the CCS functionality in HA with difficult access.

Ethics Approval and Consent to Participate

Written informed consent was obtained from all study participants. The University of Kinshasa Ethic Committee approved all protocols (Reference number: ESP/VD/DIR/CE/223/KL/2018).

Availability of Data and Material

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

Authors' Contributions

Jean Mukulukulu Etshumba contributed to the design of the evaluation protocol, the actual evaluation, the analysis of findings and the writing of the manuscript.

Dosithée Ngo Bebe contributed to the protocol development and the writing of the manuscript.

Jacques Emina contributed to the protocol evaluation, data analysis and writing of the manuscript.

Celestin Nsibu Ndosimao contributed to the protocol evaluation and the writing of the manuscript.

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The data that support the findings of this study are available on request.

Competing Interests Statement

The authors declare no conflicts of interest regarding the publication of this paper.

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List of Abbreviations

ACT: Artemisinin Combination Therapy
CAC: Community Animation Cell
CCS: Community Care Site
CHW: Community Health Worker
CMC: Community Care Site Management Committee
CME: Context-Mechanisms-Effects
DFID: Department for International Development
DHIS 2: Data Health Information System 2 software
DHS: Demographic and Health Survey
DRC: Democratic Republic of the Congo
HADC: Health Area Development Committee
HAFT: Health Area Framework Team
HC: Health Center
HZCO: Health Zone Central Office
HZMT: Health Zone Management Team
ICCM-C: Integrated Childhood Illness Case Management at Community level
LLIN: Long Light Insecticide Net
MAP: Minimum Activities Package
NGO: Non Government Organization
NHDP: National Health Development Plan
NIS: National Information System
ORS: Oral Rehydration Salts
PCHW: Provider Community Health Worker
PNECHOL-MD: Programme National d'Élimination du Cholera et Lute contre les Maladies Diarrhéiques
RDT: Rapid Diagnostics Test
RHZ: Rural Health Zone
SANRU: Sante en Milieu Rural
TFP: Technical and Financial Partner
TOC: Theory Of Change
UNICEF: United Nations International Children's, Emergency Fund
USAID: United States Agency for International Development
WHO: World Health Organization
WMR: World Malaria Rall back

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