EFFECTIVENESS OF FUNCTIONAL CAPACITIES OF COMMUNITY ANIMATION CELLS ON IMPROVING NUTRITIONAL STATUS AMONG CHILDREN UNDER FIVE IN BUNYAKIRI HEALTH ZONE IN SOUTH KIVU, DEMOCRATIC REPUBLIC OF CONGO

BY

BENGIBABUYA HOMBANYI DORIS

A THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY OF SCIENCE IN COMMUNITY HEALTH AND DEVELOPMENT

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF COMMUNITY HEALTH AND DEVELOPMENT

GREAT LAKES UNIVERSITY OF KISUMU

DECLARATION

1. THE STUDENT

I, **Doris Bengibabuya Hombanyi** - do hereby declare that this thesis is my original work and has not been submitted for the award of a degree or diploma in any other University or college.

Doris Bengibabuya Hombanyi

(Reg No. P12/S01/2021)

Signature ***Date 16 September 2021***

2. THE SUPERVISORS

We, the undersigned, confirm that this thesis has been submitted for examination with our approval as University Supervisors:

Name of Supervisor

Prof. Charles WAFULA, PhD

Dean of SoCHD GLUK/Kenya.

Signature: ***Date: 17 September 2024***

Dr Careena Otieno, PhD

Faculty of Sciences,

Signature ***Date: 18 September 2024***

PREFACE

Is there anything more precious to Humans than health ?

Socrate

DEDICATION

To you my dear parents HOMBANYI MUTALISI and MIHONYA MIALISO,
You who fathered me, and took care of me to the point of educating me so that I became what I am now.
To you my beloved Dorcas RIZIKI MAPENDANO, my forever wife, for your bravery and determination displayed throughout my training, frankly this fruit belongs to you.

To you my daughters and sons, Blandine BUIRIRE, Don Béni ONGOYEINE, Benedict BIKOLAMWANYA, Brenda BUTABUINGO, Breanna HOMBANYI, Benjamin MWALABYOSHI and Benjamine BATAIRWAKUBUYA for having deprived you of your rights so that I acquire this university education.

I dedicate to you this work.

Doris B. HOMBANYI

ACKNOWLEDGEMENTS

Every effort yields outcomes, and this holds true for our training at GLUK. Consequently, I express my gratitude to all those who have played a role, big or small, in bringing this work to fruition. First of all, I must express my gratitude to Almighty God, who granted me life, and then to those, near or far, who have contributed to our intellectual capacity. After various hardships, we are nevertheless at the moment of expressing our intense joy to others.

I thank Prof Charles Wafula, who despite his enormous commitments, had to agree to ensure the direction of this work through his regular advice, remarks and suggestions, and especially his precious directives, which allowed us to improve the content and the form, and therefore deserves our deep gratitude expressed by this little note. It is also our duty to thank the co-facilitation, Dr Careena Otieno agreeing to supervise this work and for making a greater effort to achieve this fruit of our formation.

May all the academic and administrative staff of GLUK, especially the teachers who taught me from the first year of school to the postgraduate, accept our thanks.

I would also like to thank our parents, Hombanyi Mutalisi and Mihonya Mialiso, for the sacrifices they have made from our childhood to the present day in order to provide us with a dignified education;

To the whole family;, CT Elias Bashimbe MPH , Dr Patrick BAENYI, PhD; Mr Eustache N. Dunia, MPH , Sirire M. Stockio, Dr Claude Kashasa MPH, Pascal Binyoma, Mê Yves Mutalisi, , CD Justin Kasholo, etc.,

To our friends and comrades Philipp Aksanti, Charles Lwanga, Dr Vincent Mwinja, Lievin Balume, Inedit Mwisha, Jeremie NZANZU, etc.

Our thinks to our brothers, uncles and cousins like all Hombanyi-Mutalisi, Kalukere-Chikanda, Mialiso-Chiralo, etc.

Finally, our deep consideration and gratitude to all those who are not mentioned above and who, nevertheless, have kindly helped us and are at the heart of i hearts as well as to all our readers, i say thank you.

Doris B. HOMBANYI

ABSTRACT

In 2023, the prevalence (43%) of chronic malnutrition in DRC, and 6.5% to 15% for global acute malnutrition in the provinces. The effectiveness of the functional capacities of CACs in improving the nutritional well-being of children under the age of 5 has not yet been verified. The aim of the study is to verify the effectiveness of the functional capacities of CACs in improving the nutritional status of these children in the Bunyakiri health zone. A quasi-experimental study with a sample of 280 households and 60 CAC members. Results: Several functional capacities of the CACs were identified: knowledge of continued breastfeeding of children aged 20 to 24 months, exclusive breastfeeding and the importance of feeding children 2 to 3 times a day, frequency of dietary diversity, plot garden ownership and knowledge of signs of malnutrition in children ($p < 0.05$). Factors favouring the effectiveness of the CACs were linked to knowledge of 3 meals a day to be given to the child, and good practice in continuing to breastfeed children aged between 20 and 24 months ($p < 0.05$). At the end of the intervention, the main nutritional indicators and parameters studied showed significant improvements associated with the partners' support for the work of the CACs, the use of teaching tools and knowledge of procedures for notifying cases of malnutrition, CAC members' knowledge of their roles and responsibilities, the increase in the number of households providing adequate portions of meals for children, taking into account cultural/traditional beliefs in feeding practices and valuing the role of CAC members, and the increase in motivation of CAC members ($p < 0. 05$). Programs and policies will have to be improved by adapting them to the context of the areas in order to ensure the success of community-based approaches to children's health and well-being.

LIST OF ABBREVIATIONS

CAC **:** Community Animation Cell

CHWS : Community Health Volunteers

DHS **:** Demographic Health Survey

GAM **:** Global Acute Malnutrition

ICCM **:** Integrated Community Case Management

IYCF **:** Infant and Young Child Feeding

MAM **:** Moderate Acute Malnutrition

MICS **:** Multiple Indicator Cluster Survey

RUSF **:** Ready-to-use Supplementary Food

RUTF **:** Ready-to-use Therapeutic Food

SAM **:** Severe Cute Malnutrition

UHC **:** Universal Health Coverage

UNICEF **:** United Nations Children Fund

WHO **:** World Health Organization

Contents of table

List of Tables and figures

CHAPTER ONE: INTRODUCTION

1.1 Background Information

in the world,, over one in five children (148.1 million) under five years of age were stunted in 2022. In Africa, the prevalence of stunting among children in the same age category is 30 percent, which is significantly higher than the global estimate of 22.3 percent. While Northern Africa and Southern Africa are close to the global estimate, the prevalence is much higher in the other subregions (OMS, WFP, 2022). Central Africa is the worst affected subregion, at 37.4 percent. Childhood malnutrition cause nearly half (45%) of child deaths, particularly prevalent in low socioeconomic communities within developing countries (World Health Organization., 2019). In the Democratic Republic of the Congo (DRC), nutritional assessments derived from extensive studies such as the Demographic Health Survey (DHS) and Multiple Indicator Cluster Survey (MICS) reveal a disturbing prevalence of both chronic and acute undernutrition. The country experiences a notably high overall poverty rate (71.34%), surpassing that of other Central African nations (Likaka, E., Kiangana, E., & Ngaboyeka, 2023). Furthermore, malnutrition remains a prominent health issue, with 43% suffering from chronic malnutrition. The prevalence of Global Acute Malnutrition (GAM) varies between 6.5% and 15% across provinces in DRC, with an average of 2% severe acute malnutrition (Likaka, E., Kiangana, E., & Ngaboyeka, 2023).

Childhood malnutrition results from insufficient food intake, poor sanitation, low parental education, and occurrences of diarrhoea and other infections (Amare, Z. Y., Ahmed, M. E., & Mehari, 2019); Gebre, Reddy, Mulugeta, Sedik, & Kahssay, 2019). Inadequate nutrition is closely linked to factors such as food insecurity, insufficient maternal and child care, deficient health services, and unfavorable environmental conditions, all of which have adverse effects on bodily functions and clinical outcomes (Bouma, 2017). These challenges contribute to anthropometric deficits among children under five in developing nations (Abarca-Gómez *et al*., 2017). This phenomeno is observed in sub-Saharan Africa and many developing nations where severe urban poverty is predominantly found in temporary or informal squatter settlements and slums. A significant overhaul of the global food and agriculture system is essential to meet the pressing requirement of nourishing the millions facing undernourishment and the projected additional 2 billion people anticipated by 2050 (Likaka 2023), with Asia and Africa being the most affected.

A community-based approach to nutrition through community animation cells is essential for improving nutritional status, engaging with communities can expedite the execution of interventions that align more closely with local needs, guided by community-specific knowledge and priorities, thereby enhancing effectiveness (King *et al*., 2021). Community health structures are mechanisms established in the community through which individuals voluntarily participate in decision-making and oversight of the delivery of primary healthcare services at the community level (Pires *et al.,* 2020), including nutrition programs. The community-level approach encompasses activities such as Community Animation Cells and mobilization, the outpatient management of moderate acute malnutrition (MAM) and severe acute malnutrition (SAM) without medical complications, as well as the early detection and monitoring of malnutrition cases (Kouam *et al.,* 2014). Notably, evidence regarding the effectiveness of approaches to managing MAM and SAM per the WHO protocol in developing countries indicates that globally, the management of acute malnutrition tends to be either focused on specific populations, and specific interventions, or exhibits disparities in the definition of malnutrition and the types of therapeutic or supplementary foods used (Das, Salam, Saeed, Kazmi, & Bhutta, 2020).

Despite previous evidence from countries such as India, Bangladesh, South Sudan and Kenya showing that widespread adoption of the community engagement strategy is effective in reducing child malnutrition, the researchers acknowledged the necessity for a thorough examination of existing evidence concerning the effectiveness of various community and facility-based strategies in identifying and managing MAM and SAM. This includes aspects such as community-based screening, identification management, the relative effectiveness of ready-to-use therapeutic food (RUTF) for SAM and ready-to-use supplementary food (RUSF) for MAM, the effectiveness of prophylactic use of antibiotics in treating uncomplicated SAM, and the effectiveness of vitamin A supplementation for children with acute malnutrition (Das *et al.*, 2020; Lenters, Wazny, Webb, Ahmed, & Bhutta, 2013). In Mali, community health workers' package of interventions extended beyond just diagnosing malnutrition to encompass treatment. This comprehensive approach resulted in a remarkable 95% recovery rate for malnourished children treated by community health workers within the community, surpassing the 88% recovery rate for those treated in health centers. The findings underscored that community health workers can deliver effective treatment for cases of severe acute malnutrition without complications as part of the integrated Community Case Management (iCCM) (Alvarez Morán *et al.,* 2018).

Community participation in health programs like integrated Community Case Management (iCCM) in the DRC towards malnutrition management in children under 5 years faces many challenges related to lack of access to information on good nutrition practices by the community, lack of effective training on health preventive and promotion services to enable community participation, poverty of the inhabitants, political instability and war that has resulted into high rates of stunting and child mortality (Riri, Silumbwe, Mweemba, & Zulu, 2022) case example of South Kivu which has limited access to healthcare. Research findings in DRC highlight the lack of information by the community on feeding practices and meal frequency, insufficient food intake, and limited dietary diversity among others which can be given by the community health workers if adequately trained and their capacity to involve community animation cells built to counsel on preventative aspects of Infant and Young Child Feeding (IYCF) practices, which is crucially needed in strengthening the nutrition elements of the children under five (Doocy *et al.,* 2019). The emergency situation, following the socio-political unrest that the country has been experiencing since 1990, has led to the introduction of humanitarian interventions, an approach which has been essentially selective to health problems and more of curative than preventive and promotive (Le Gargasson, *et al,* 2013).

Goal Standard of nutritional status

Ensuring adequate nutrition during the first two years of life is crucial for a child's growth and nutritional development. Diets that are nutritionally adequate, safe, suitable for the child's age, and aligned with their nutritional needs are crucial to preventing stunting in infancy and early childhood, thereby interrupting the intergenerational cycle of undernutrition (UNICEF, 2022). While good nutrition is a cornerstone for achieving developmental objectives, numerous constraints and barriers in many low- and middle-income countries impede the efficiency, effectiveness, and scalability of programs, particularly impacting children in need and those in fragile contexts (Musselman, 2020) The World Health Organization (WHO) and other international health entities have established specific standards and indicators that serve as a global gold standard for evaluating nutritional status which include measures of stunting, wasting, and underweight that are critical indicators of malnutrition and its effects on growth, development, and overall health (WHO, 2021).

The CAC is a structure for coordinating community initiatives at the village/cell level. It is made up of all the active forces of the village/cell: religious and opinion leaders and delegates

from community-based organizations, water-hygiene and sanitation committee. The composition of CAC is a multi-sectoral and multidisciplinary community structure Made up of all the active forces of the village/cell: schools, agronomists, RECO, religious leaders, opinion leaders, delegates from community-based organizations, water-hygiene committee and sanitation The mandate of CAC members is 3 years, renewable once. The modalities for setting up a CAC: Advocate to the local political-administrative authority, raising community awareness**,** take stock of the existence of basic social services and the structures of PARTICOM**,** establish the facilitation team (IT, ITA, ECZ, leaders of other nutrition-sensitive sectors or NGOs), convene village/cell assemblies by village/cell leaders and Organize the election of members during the village assembly chaired by the village chief/Kapita Most of their roles and responsibilities are:

• Develop and implement the community action plan and maintain village works with the participation of all the village's key actors; Develop and implement local emergency response plans. Ensure the safety of materials and equipment assigned to the villages

• Coordinate communication and promotion activities for practices favorable to health, nutrition, development and protection; Organize community discussions on the results of monitoring and promotion of growth, VAD and other information. Coordinate delivery activities at the community level (health, nutrition, WASH, protection, gender, education, rural development, etc.) and Coordinate village/cell development activities;

• Community distribution (Vitamin A, Mebendazole, Multi-micronutrient powder, Family kits, Condoms, LLIN, Power of attorney for birth registration, Aquatabs, school grant, ivermectin, etc.

• Screening, population enumeration/identification and Community monitoring;

Compile village/cell data and transmit them to higher levels (CODESA, COPA, Territorial Coordination, etc.). The expectations of CAC members are that if they are efficacy with functional capacities, 80% of children aged 0-59 months should be exclusively breastfed, 80% of them, while 80% of them, those aged 20-24 months should continue to breastfeed. be breastfed. Also 50% whose age ranges from 6 to 59 months consume adequate complementary foods, i.e. at least 3 meals per day at a 4 Star ration. But also 80% of children aged 6-59 months with a MUAC>125mm and 80% of those aged 0-59 months must attend the preschool consultation. In this area, activities should be coordinated and reported regularly to the health center.

A pre-inquiry short verbal survey carried out in Bunyakiri Health Zones indicated that at least three quarters of the respondents who were majorly members of CAC, agreed to the fact that

community participation is still at its low in relation to the implementation of heath actions mostly in health prevention services that could see reduction in malnutrition cases hence reduced morbidity and mortality rates (Personal Communication, 2022).

1.2 Problem Statement

Situation in the specific location

The DRC is one of ten countries that account for 60% of the global burden of under-five stunting (Likaka *et al*., 2023). According to the World Food Crisis Report 2022, the DRC is one of the fifteen countries most affected by the global crisis (UNICEF, 2022). Poor sanitation, limited access to quality health care and inadequate dietary diversity have a significant impact on child nutrition, resulting in high rates of stunting and wasting (UNICEF, 2020). Nutritional challenges among children under 5 years of age have persisted in Bunyakiri, with a complex interplay of cultural, socio-economic, health-related factors, and political instability (Kavle *et al.*, 2019). In 2021, Bunyakiri health zone was one of the most affected by chronic malnutrition, with a prevalence rate of 66.4% (UNICEF, 2022), above the normal threshold of 40%, and chronic acute malnutrition at 39.8%, above the acceptable threshold of 20%.

Challenges in implementation

Strengthening the effective functional capacity of community health workers has emerged as a potential solution, and they have proven to be effective in mobilizing and educating communities, making them instrumental in disseminating critical information on proper nutrition, breastfeeding and dietary diversity. This has not been the case in Bunyakiri, despite the presence of the Community Animation Cells and the various community-based nutrition management programs since 2016. This can be explained by the fact that standardized approaches are implemented without taking into account the specific socio-economic and cultural context of Bunyakiri. To bridge this gap, it's crucial to explore innovative solutions to increase the impact of CAC involvement in community-based nutrition approaches, and to develop or review practical guidelines and tools to address other challenges related to the lack of feasibility and applicability of many of them at the local level. In Bunyakiri, CACs face constraints such as insufficient training days, limited participation of their members, lack of monitoring and poor IGAs.

It is essential to establish robust monitoring mechanisms and support from the health zone executive team to ensure successful implementation. Certain standard activities may need to be adapted to the Bunyakiri-South Kivu context, given the economic constraints of households in the area/région. This will require a review of the tools to tailor them to the resources available at community level.

What has been and has not been studied

Although some studies have looked at the broader role of community-based interventions and the significance of community participation in improving child nutrition, these efforts often present contradictions in outcomes and impacts. Some studies suggest a positive association between community engagement through community health workers and improved nutritional practices (Dearden, Bishwakarma, Crookston, Masau, & Mulokozi, 2021; Ozano, Simkhada, Thann, & Khatri, 2018) while others have shown barriers in sustaining such interventions due to various contextual factors (LeBan, Kok, & Perry, 2021; Roach & Fritz, 2022). These discrepancies underscore the need for a more in-depth and context-specific investigation to clarify the functionalities and impact of CACs on nutritional status.

Existing literature hints at the potential of community involvement through CACs, but a lack of detailed exploration specific limiting understanding. The variations and inconsistencies in findings across studies emphasize the necessity of a focused inquiry to comprehensively understand the role and effectiveness of CACs in influencing the nutritional status of children under 5 in this particular region. This study therefore aims to ascertain the effectiveness of the functional capacities of the Community Animation Cells in improving nutritional status of the under 5 years old in Bunyakiri Health Zone in South Kivu-DRC while assessing the knowledge, perception and practices of both CAC members and household members of the under 5-year-old children.

The current situation

In the context of malnutrition is marked by three severe manifestations: wasting, underweight, and stunting. Wasting is a critical form of malnutrition characterized by the rapid and substantial loss of body weight and muscle mass, often observed in children who lack adequate nutrition or are affected by diseases causing severe weight loss. In contrast, stunting indicates compromised growth and development in children due to chronic malnutrition, typically stemming from prolonged inadequate nutrition and recurrent infections during early childhood. Underweight is a condition in which a person has a lower body weight than what is considered

healthy or appropriate for their age, height and gender. Perception plays a crucial role in understanding how individuals interpret and make sense of sensory information from their environment, involves mental impressions and comprehension of the world based on sensory stimuli. Knowledge is the understanding, awareness, and familiarity acquired through learning, experience, study, or observation, empowering individuals to interpret and make informed judgments about various aspects of the world. Practices are habitual actions, behaviours, or activities that individuals, groups, or communities regularly engage in as part of their routine, shaped by cultural, social, or organizational norms.

Effectiveness is a measure of how well a task, process, strategy, or action achieves its intended goals, indicating the ability to produce desired and impactful results in an efficient and meaningful manner. Functioning pertains to the operation, performance, or working condition of a system, entity, or individual, encompassing the activities, processes, or behaviors they engage in to fulfil their intended purpose or role.

In the socio-cultural context of Bunyakiri health zone, traditional medicine plays a significant role in the community's life, with practices like tattooing and uvula section observed in children. Cultural habits often lead people to seek healing through prayer, sometimes delaying medical intervention until the condition worsens.

Additionally, prevalent practices such as polygamous marriage and differing societal norms for men and women influence community dynamics. Children's eating habits range from breastfeeding to porridge made from banana, corn, sorghum, soya and peanut flours. This breastfeeding is not generally exclusive by most communities given the economic living conditions pushing women to rural and other activities requiring more time without being with their young children. This leads us to emphasize that the population of the Bunyakiri health zone is agriculturally oriented, they cultivate cassava, beans, peanuts, corn, squash and oil palm, but they also take care of ' breeding of small livestock (poultry, goats, sheep), fish farming, small commerce, and logging. This remains the activities of CAC members who are an integral part of the population. The population of Bunyakiri is largely literate but overwhelmingly male. This means that the CAC is generally full of literate people, although it sometimes happens that certain people are in the extended committee without a significant level of study thanks to their experience, status and community influence. Especially since some members are co-opted by the village chief. Let us end this part by saying that the CACs in general experience enormous difficulties in succeeding in their activities in a context of low education of members, poverty

of communities with monotonous eating habits and access to culture while their work is voluntary and complex in means. Materials and technique is also included. The factors that would help them succeed in their mission are not easy and require special attention and adequate support.

1.3. Justification of the study

Nutrition has become a public health concern and as such both globally, regionally and national, investments in policies and programs have been initiated. This study contributes to efforts to improve effectiveness of nutrition improvement programs, which, goes a long way to improve impact and realization of the pressing need for good nutrition. For instance, WHO through Report of: Prioritizing Essential Nutrition Actions in a National Nutrition Strategy: A Framework for Action, has developed for prioritizing actions based on the WHO publications Strategizing national health in the 21st century: a handbook (Schmets *et al* 2016), the WHO Stepwise framework for preventing chronic diseases (Epping-Jordan *et al* 2005) and Managing programs to improve child health (WHO 2016); all for helping and encouraging nations to adopt and improve the nutrition situation of their children. Furthermore, the importance and focus of global and national resource investments for nutrition has been prioritized through key global, regional and national declarations, plans and policies. It is for this reason that the member countries of the United Nations have signed up to several international declarations on health, in particular that of Alma Ata (USSR) in 1978 on primary health care recently reaffirmed through the Astana Declaration (WHO 2018), in which the role of community relays in improving access to the health system has been constantly recognized, in order to achieve the MDGs supplemented by the SDGs. Other key resource advocating and allocating documents on nutrition include, the Framework on integrated, people-centered health services (WHO 2016), The 2030 Agenda for Sustainable Development (UN 2015), among others. In the DRC, the CAC (Cellule d'Animation Communautaire) approach is relevant in terms of community participation in sectoral strategies for nutrition (People in need, 2023. It is designed to meet the priority health needs of communities. All these efforts point to the high-ranking nutrition improvement efforts that it is, which this study aims to contributed to.

1.4 Objectives of the study

1.4.1 General objective

To determine the effectiveness of the functional capacities of Community Animation Cells on improving nutritional status among under five in South Kivu- DRC.

1.4.2. Specific objectives

1. To assess the functional capacity of community animation cells to improve the nutritional status of children under five in South Kivu DRC.
2. To identify factors that promote the effective implementation of the functional capacities of the Community Animation Cells for the improvement of the nutritional status of children under five in South Kivu-DRC.
3. To test the effectiveness of the established functional capacities of the Community Animation Cells in improving the nutritional status of children under five in South Kivu-DRC.

1.5 Research questions

1. What are the functional capacities of Community Animation Cells for nutritional status improvement among under five in South Kivu-DRC?
2. What are the factors promoting effective implementation of functional capacities of the Community Animation Cells for nutritional status improvement among under five in South Kivu-DRC?
3. The established functional capacities of the Community Animation Cells are they effective in improving the nutritional status of children under five in South Kivu-DRC ?

1.6 Scope of the Study

The scope of this study was limited to Bunyakiri health zone, in South Kivu east of the DRC. The study did not cover other regions in DRC, and the findings may not apply to other populations or settings outside of the DRC. The primary target population included caregivers of children under five living in the various villages of Bunyakiri Health Zone and CACs. The

study did not look at how No-child specific health factors pertain to the effectiveness of CAC's functional capacities on improving the under-five's nutritional status.

1.7 Significance of the Study

Community Animation Cells have emerged which can potentially change the narrative within these communities. Endowed with functional capacities, they effectively engage, educate, and mobilize community members, exerting a pivotal influence on health-related behaviours and knowledge dissemination. Evaluating the effectiveness of these entities in enhancing nutritional status among vulnerable children under the age of five is imperative. Such evaluation is critical for formulating sustainable strategies that can yield positive, lasting outcomes. Additionally, this study aligned with and supports global health initiatives, notably the Universal Health Coverage (UHC) efforts.

By assessing the role of Community Animation Cells in improving nutrition, the study contributes to the broader objective of achieving UHC, striving to ensure all individuals and communities have access to quality health services without financial strain, and ultimately working towards a healthier future for children worldwide.

As part of the objectives pursued by this study, at the first level we want through this study to demonstrate the functional capacities of CAC in the significant contribution improving the nutritional status of children under 5years. This highlighted the different levels of knowledge, perceptions and operational practices of ACA members in nutrition which make it possible to make this contribution associated with improving nutritional status.

Secondly, the study came out with the factors that allow these CACs to effectively operationalize their functional capacities, which promise the nutritional status of children under 5 years.

Then, the research findings helped to improve the CAC guideline implementation tools, develop evidence-based decisions, policy improvement and development of innovate interventions models that will be used by the community animation cells to strengthen community nutrition-based participation approaches in DRC, especially in communities affected by insecurity towards improving nutrition status of the under 5 years old. The study also endeavors to contribute to the advancement of public health initiatives by offering empirically supported recommendations that can strengthen the effectiveness of Community Animation Cells and similar community-based structures. The findings of this study will

equally help in academia, providing scholars with the literature on how community-based systems have an influence of health outcomes in a community.

1.8 Limitations of the Study

The data for this study was collected from one health zone and this may not be representative of other regions in the DRC. The study area is also a humanitarian crisis setting, protracted with ongoing conflict and facing a myriad of challenges in its healthcare system limiting data generalizability. There might also be recall bias of the study participants as the tool is self-reported and some might inaccurately report their responses.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

2.1.1. Social Cognitive Theory

This learning theory was developed by the renowned Stanford psychology professor Albert Bandura. It underscores the significance of learning within a social context and proposes that individuals are active agents capable of influencing or being influenced by their environment. As outlined by Bandura (1969), the theory suggests that people acquire new behaviors by observing the actions of others and the outcomes of those actions. Positively reinforcing a behaviour inclines more people to mimic, whereas the act of punishing diminishes the probability of imitation.

In the context of the effectiveness of community animation cells on the nutritional status of children under 5 years old, the Social Cognitive Theory suggests that children and household members can learn about healthy eating habits and nutrition by observing their peers and community members. Community animation cells provide a platform for children to witness positive behaviour related to nutrition and develop an understanding of the importance of healthy eating. By observing others' behaviors and their outcomes, people can acquire knowledge and skills that contribute to improved nutritional status.

Moreover, the theory highlights the significance of cognitive processes, including judgment, conceptions, and motivation, in shaping behavior. It contends that individuals actively interpret the consequences of their actions, thereby influencing their environments and personal factors. This process informs and modifies subsequent behavior based on these cognitive assessments. This perspective acknowledges that human behavior is not only determined by environmental inputs but also influenced by internal cognitive processes as well.

2.1.2 Diffusion of Innovations Theory

Diffusion theory is a sociological theory that explains how new ideas, practices, or technologies spread within a community or social system (Chang, 2010) .According to the theory, the diffusion process involves knowledge, implementation, persuasion, decision, and confirmation. The theory identifies different types of individuals within a social system based on their willingness to adopt new ideas or practices (Sahin, 2006).

In the context of the effectiveness of community animation cells on the nutritional status of children under 5 years old, the Diffusion of Innovations Theory can provide insights into how these innovative interventions can be adopted and implemented within a community. The

theory also suggests that early adopters within a community can serve as change agents by actively participating in these cells and demonstrating positive outcomes. Their involvement can create awareness and generate interest among other community members, leading to increased adoption and implementation of nutrition-specific interventions.

By understanding the diffusion process and the factors that influence adoption decisions, community animation cells (CAC) should be designed and implemented in a way that maximizes their effectiveness in improving the nutritional status of children under 5 years old. This theory provides valuable insights into how innovative interventions can be diffused within a community and how behavior change can be facilitated at the individual and community levels.

2.2 Review by specific objective.

2.2.1 Functional Capacities of Community Animation Cell for Nutritional improvement

Knowledge of Community Animation Cells on nutrition

In a study conducted in rural India, researchers examined the contribution of community health workers to enhancing complementary feeding practices among children receiving home-based care. (Garg, *et al.,* 2023). Community health workers (CHWs) have proven to be successful in enhancing Infant and Young Child Feeding (IYCF) practices within communities. Numerous nations have likewise adopted the integration of child illness management through CHWs. India, in particular has established a workforce of approximately one million CHWs, referred to as Accredited Social Health Activists (ASHA), with the primary aim of ensuring adequate nutrition.

Healthcare services or medical staff with tight schedules may need to assist numerous mothers within a restricted timeframe, which can pose a challenge to delivering counseling, l*et al*one high-quality counseling. Consequently, counseling might not take place, be overly generalized to the point of being ineffective, or be targeted at a limited group of mothers, such as those with already malnourished children. This diminishes its overall impact and capacity to prevent vulnerable children from developing malnutrition (Lutter *et al.,* 2013). In the Democratic Republic of Congo (DRC), child undernutrition has shown an upward trend in recent years. In 2001, it was estimated that 38% of children under 5 years were stunted, and this figure increased to 43% in 2010, this is more pronounced in eastern provinces due to a history of conflict. (Burns *et al.,* 2016b).

In general, complementary feeding is always introduced between ages of 7 and 12 months. Porridge is usually the first meal followed by solid foods like *cassava, fufu and sombe*.
Children aged 6 to 12 months in the Democratic Republic of Congo (DRC) tend to have diets with limited food diversity. In group discussions, mothers frequently reported that sugar is the most commonly added ingredient to porridge. A small percentage of mothers mentioned enriching porridge with meat/fish (20%) or eggs (19%). A slightly higher percentage mentioned adding colorful fruits and vegetables (24%), milk (26%), soy flour (30%), or sugar (23%) to enhance the nutritional value of the porridge. When asked about the variety of foods that should be included in a 6- to 12-month-old child's diet, less than half of the mothers mentioned fish (20%), eggs (42%), yellow vegetables (38%), meat (41%), or green leafy vegetables (60%). Despite some mothers expressing positive attitudes towards incorporating nutrient-dense foods into their children's diet, 87% of them felt that the high cost of these foods made it challenging for them to obtain such items (Burns *et al.*, 2016b).

Healthcare professionals have a significant role in encouraging women to embrace recommended practices in a positive manner. Mothers described clinic healthcare workers and community health workers as caring (37%), well trained to counsel on child feeding (26%), and often considered them highly intelligent. The majority of mothers (94%) expressed trust in the health workers' advice regarding child health and feeding, viewing them as the most credible source of guidance on pregnancy-related matters, breastfeeding, and child care practices. A study conducted in the Katana and Walungu health districts of South Kivu demonstrated that community health promoters could improve exclusive breastfeeding rates. However, at the six-month mark, only 58% of infants in the intervention group were exclusively breastfed, indicating that additional challenges to exclusive breastfeeding need to be addressed through interventions.In a randomized controlled trial of ready-to-use complementary food in South Kivu, no significant difference in nutritional status was found between the intervention and control group infants. The authors hypothesized that environmental enteropathy and the presence of anti-nutrients like phytates might contribute to these outcomes, which are frequently present in complementary foods within this particular population, could potentially hinder nutrient absorption (Burns *et al.*, 2016b).

Community case management (CCM) entails the training, support, and provision of resources to community cell animators. These animators are tasked with assessing, classifying, and managing children who appear unwell and face challenges accessing health facilities within

their immediate environment. There is growing evidence suggesting that CCM and community health worker (CHW) programs can contribute to a significant reduction in overall child mortality. A survey conducted in 2010 across sub-Saharan African countries indicated that 29 countries were implementing CCM for diarrhea and 26 for malaria, among the 40 surveyed countries.

In 17 countries, the composition of Community Health Workers (CHWs) delivering CCM services included individuals of both genders. In 8 countries, the majority of CHWs were female, while in 9 countries, the majority were male. In one country, the CHW cadre exclusively consisted of females. Volunteers were involved in providing community case management (CCM) in 27 countries, while paid community health workers (CHWs) were doing so in 14 countries. Additionally, traditional birth attendants were implementing CCM in three countries, and mid-level providers were engaged in four countries. Another type of CHW was offering CCM in five countries. Importantly, it's worth noting that in several countries, there was more than one type of cadre involved in providing CCM (Rasanathan *et al.*, 2014). Incentives for Community Health Workers (CHWs) involved in providing community case management (CCM) exhibited variation, often employing different types of incentives within the same country. Salaries were provided by the Ministry of Health in six countries and by NGOs in two countries. User fees for CCM were still applicable in six countries, with mark-ups on commodities in 10 countries, predominantly in West Africa. Incentive payments were offered by the Ministry of Health in 10 countries and by various NGOs in 19 countries. No-monetary incentives were utilized in 23 countries. Overall, there is a crucial need to integrate Community Health Workers (CHWs) and community case management (CCM) as integral components of national health systems. This integration is essential not only to unlock the full potential of CCM but also to address information gaps related to CCM activities (Rasanathan *et al.*, 2014).

Strategy in the Democratic Republic of the Congo (DRC) represents an equity-based approach designed to address both child illness and undernutrition. This strategy was launched in December 2005, aims to address child illness and undernutrition equitably. However, it falls short in adequately integrating nutrition due to its focus on treatment rather than prevention. Health workers often do not follow WHO protocols for managing acute malnutrition. The current strategy primarily includes screening for malnutrition and brief guidance on feeding sick children, neglecting preventive measures like promoting breastfeeding and complementary

feeding. This lack of emphasis on nutrition leaves gaps in understanding beliefs, perceptions, and care-seeking behaviors related to infant and child practices. There's a need to enhance the capacity and skills of community health workers who seldom visit homes due to lack of support and insufficient training.. (Kavle *et al.*, 2019)

An estimated 10.6 million children under the age of five still succumb to preventable or treatable diseases annually. A substantial portion of these fatalities is associated with health issues covered by Integrated Management of Childhood Illness (IMCI), encompassing acute respiratory infections, malaria, measles, diarrhea, and malnutrition. A significant number of these deaths could be averted through timely, suitable, and cost-effective treatment of ill children at home or within the community, involving the use of antibiotics, antimalarials, or oral rehydration therapy (Organization, 2006).

In recent decades, there has been a notable and sustained reduction in child mortality across many low- and middle-income countries. However, an estimated 10.6 million children under the age of five still succumb to preventable or treatable conditions, including malnutrition, each year. Various approaches can be employed to intervene and prevent infant deaths, and referral is one such approach. When a sick child is identified as needing treatment with antimicrobial agents, the CHW typically verbally refers the child to an existing health facility. The CHW also encourages caregivers to seek care from health facilities through educational efforts during meetings and household visits. This education may encompass topics such as recognizing signs of dehydration, malaria, and respiratory diseases.

Most Community Health Worker (CHW) programs operate through coordination and collaboration among multiple partners and stakeholders. Strong links between these partners can enhance the overall capacity of the program. The roles of each partner may differ, but solid connections with the community and the Ministry of Health can contribute to the sustainability of CHW programs. The community, including community groups, No-governmental organizations, and the Ministry of Health, may each play unique roles in a CHW program, particularly when referrals are necessary (Organization, 2006). It is also important that referral policies are integrated in malnutrition prevention programs involving community health workers. In the context of community-to-facility referral, it is essential to clearly articulate the expected outcomes in program documentation. Both the process and impact of referral activities should be subject to evaluation. Additionally, the measurement of referral activities conducted

for individual CHW is crucial to ensure a consistent and high quality of service (Organization, 2006).

Perceptions of Community animation cells' members on nutrition.

In a study conducted in Niger, Community Health Workers (CHWs) recommended screening for acute malnutrition in the community by assessing the middle upper arm circumference (MUAC) of children aged 6 to 59 months (Alé *et al.*, 2016). MUAC serves as a straightforward screening tool that has demonstrated better predictive capabilities for mortality in children with acute malnutrition compared to other potential anthropometric indicators. Since the 1980s, it has been established that mid-upper arm circumference (MUAC) assessments can be conducted by minimally trained personnel, leading to current recommendations for community health workers (CHWs) to use MUAC for screening. MUAC offers several advantages: it serves as a superior predictor of mortality, especially when performed at regular intervals, compared to other practical anthropometric measures like the weight-for-height z score (WHZ). The simplicity of MUAC makes it easy to use, and regular screenings in the community enhance early diagnosis, thereby reducing the risk of mortality and morbidity that might necessitate costly and specialized hospital care (Alé *et al.*, 2016).

Mothers are well- suited to recognize signs of nutritional decline in their own children. Instructing mothers to consistently use mid-upper arm circumference (MUAC) measurements and identify edema represents a logical decentralization effort. This approach could lead to improved coverage, earlier detection, and treatment-seeking, thereby enhancing program outcomes and reducing the cost per case treated. A recent study, comparing Community Health Workers (CHWs) and mothers using color-coded class indications instead of actual measurements, demonstrated the potential effectiveness of this approach. Mothers exhibited high sensitivity and specificity for Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM, 115 mm < = MUAC < 125 mm). There were high levels of agreement between mothers and CHWs, and a similar number of classification errors occurred only at the boundaries between normal/MAM and MAM/SAM. Accuracy was not influenced by which arm (right or left) was measured or by how the mid-point of the upper arm was determined (by-eye or by measurement), providing evidence that could simplify training while maintaining accuracy and precision (Alé *et al.*, 2016)

Community-based nutrition approaches are very crucial for improving nutrition, especially in developing countries, as they tend to be a specialized approach for specific nutritional needs of a community. The evidence from the identified studies suggests that community- based nutrition education improves the nutrition status of under-five children in developing countries (Majamanda, *et al.,* 2014). Community Animation Cells workers are capable of performing a range of tasks, which include the case management of childhood illnesses such as malaria, pneumonia, and neonatal sepsis. They are also involved in the delivery of preventive interventions like immunization, the promotion of healthy behavior, and community mobilization. Numerous trials have demonstrated significant reductions in child mortality, particularly through the case management of ill children through these community interventions (Haines *et al.*, 2007).

Research results suggest that community-based nutrition interventions facilitated by community animation cells have significantly influenced the nutritional well-being of children under the age of five in developing nations (Majamanda *et al.*, 2014). In Brazil, Community Health Workers (CHWs) have experienced significant expansion over the past three decades, functioning as integral members of health teams that provide services to populations of approximately 1,000 families within a defined geographic area. As of now, Brazil boasts 222,280 CHWs, with each typically conducting monthly visits to around 150 families, reaching a total of 110 million individuals. Brazil has achieved one of the most consistent reductions in under-five mortality rates globally, meeting its child mortality Millennium Development Goal (MDG) target in 2010, five years ahead of the scheduled period.

Presently, only 2% of children are underweight, immunization coverage is at an impressive 99%, 91% of women receive four or more prenatal visits, 93% of family planning demand is met, and 90% of eligible women receive treatment to prevent mother-to-child transmission of HIV. Additionally, about 88% of estimated TB cases are detected, drinking water coverage and improved sanitation coverage stand at 98% and 96%, respectively. Furthermore, 95% of AIDS patients in need of medication are receiving it. The success of Brazil's CHW program has inspired several other nations, including South Africa, which are currently in the process of implementing CHW programs modeled after Brazil's approach (H. Perry & Zulliger, 2012).

Studies on their impact in community-based nutrition interventions, India indicated that CHWs Program was effective in achieving significant improvements in breastfeeding and reducing

childhood stunting. (Vir SC., *et al.*, 2014). Comparable research conducted in Kenya demonstrated that the utilization of Community Health Workers (CHWs) resulted in a decreased prevalence of underweight children within the study group (C. J. Sawe, *et al.*, 2020). In Mali, the package of interventions provided by community health workers went beyond the diagnosis of malnutrition to include treatment as well. This comprehensive approach resulted in an impressive recovery rate, with 95% of malnourished children treated by community health workers in the community recovering, compared to 88% of those treated in health centers. These results suggest that community health workers can effectively administer treatment for severe acute malnutrition cases without complications as part of the integrated Community Case Management (iCCM) (Basil *et al.*, 2022).

In a 2022 study by Kandala *et al.* on malnutrition among children under five years of age in the Democratic Republic of the Congo (DRC): Does geographic location matter? Discussing the essential concepts of the nutritional status of children under the age of 5, these authors used data from the 2007 DRC Demographic and Health Survey (DHS-DRC). In their analyses, the authors stated that the children in their study had all the data relating to anthropometric measurements. As the study covered both rural and urban areas, malnutrition among children was more prevalent in rural than in urban areas. So child malnutrition is spatially structured. Nevertheless, if these authors were to employ a methodology that includes Community Animation Cells in the different provinces examined in the study, the outcomes could offer insights into how effective these individuals are in implementing advanced approaches for conducting nutrition promotion awareness sessions, particularly in rural regions.(Kandala, *et al.*, 2011)

In this study conducted by Chloe Puett, the aim was to compare the cost-effectiveness of PCMA delivered by CHWs compared with hospital treatment of SAM. Their results show the added value of community-based management of severe acute malnutrition in children under 5 years of age by members of Community Animation Cells or community relays. Effectively implementing CACs as part of their responsibilities enables the identification and admission of children in a precarious nutritional condition before they experience complications, and these children can be treated efficiently at the community level. The contribution of the CACs has been demonstrated in this study, although others should extend their studies to include case-control cohorts in order to determine the real factors involved. In the treatment of SAM through

the intermediary of CHWs in the reduction of expenditure for children treated at community level than in hospital (Puett *et al.*, 2013)

Bisimwa Balaluka Ghislain, in his thesis study on the Prevention of Malnutrition in South Kivu (Democratic Republic of Congo): the role and effectiveness of community-based interventions, 2012.This study brought together several studies, three of which were quasi-experimental based on data collected by community relays, and two other observational studies which used qualitative methods to identify and discuss the rewards encouraging community volunteers. All the studies showed the interest of all the members of the Community Animation Cells , including the community volunteers or community relays, through their ability to mobilize people, but that this did not increase the obvious value of the incentives linked to their motivation and their involvement in lucrative activities carried out in the health zones. These studies have therefore shown that the community relays who are members of the CACs can also contribute to monitoring the growth of children under the age of five and to promoting exclusive breastfeeding in rural and urban areas, thereby helping to improve the nutritional status of these children under the age of 5. As you will see, the capacity of these CACs also depends on how they are organized in each area, given that the WHO protocol for community-based management of malnutrition and the operation of village committees or CACs are not standardized internationally.
Thus, if the author were to carry out a case-control study in order to understand the determinants linked to the operating capacity of these CACs, the major evidence would make it possible to orient public policy to the advantage in terms of community-based management of malnutrition in children under 5 years of age. Hence, through this study, we will be able to develop these aspects as a complement to this study

In their research "*why people choose to volunteer? Women health volunteers 'activities, reasons for joining and leaving*" carried out in Iran by Hamed Rezakhani Moghaddam *et al.* it was clearly stated that Culture-building about the role of health volunteers, the valuing on their activities in the community, and informing program supervisors about the health volunteer's duties would help to retain health volunteers and also sustain their activities at the community level.(Kowitt, Emmerling, Fisher, & Tanasugarn, 2015).It was observed that Although the health volunteer program is implemented without paying salary or regular rewards, some participants remarked that incidental incentives (such as free visits) for health volunteers and their family, and benefiting from such rewards further enhances their motivation to work. Some

participants had a belief that health volunteers do collaborate with the program, with a hope to be ultimately hired in the health system through them participating in health center activities. The majority of respondents expressed a desire to learn about health as a significant motivator for joining health volunteer programs. They believed that the presence of health volunteers in their community improved their knowledge and awareness. One health volunteer mentioned that they had joined the program to learn what to do in case of a disease outbreak.

The conclusion drawn was that financial benefits are not the sole reason for people to join or leave Women Health Volunteers (WHVs) programs. By implementing measures such as building a cultural understanding of the role of health volunteers and emphasizing the value of their activities in the community, the retention and sustainability of women health volunteers' activities could be more effectively managed. Additionally, there is a need to inform program supervisors about the duties, importance, and role of health volunteers in the community.

In a research study conducted in Eastern Democratic Republic of the Congo (DRC) on factors motivating health workers, it was observed that a combination of both social and economic incentives, varying from intrinsic to extrinsic and immaterial to material, including financial incentives, would be more effective in motivating individuals to volunteer as community health workers, particularly in Eastern DRC. Examples of these incentives include free access to health care or reduced-cost access, participation in Savings and Loan Associations within the Health Facility Committee, regular provision of equipment, transport fees, and ongoing training opportunities. These factors were found to have a positive influence on the motivation of Community Health Workers (CHWs) in the region (Kyamusugulwa, 2020).

To realise full potential of community animation cells in ensuring high nutritional status there are a number of activities that must be done for example education and training, community engagement, cultural sensitivity, empowerment among other activities. For a community animation cells (or any health worker) to be productive, a number of broad-based and interrelated inputs are required. These include (Jaskiewicz & Tulenko, 2012): capacity (knowledge, skills, and attitudes), motivation, organizational support or the “opportunity to do the job well” (resources, physical and social environment, working conditions) While the capacity and motivation (both extrinsic and intrinsic) to do the work are essential determinants of a CAC productivity (Jaskiewicz & Tulenko, 2012)

In a research study conducted in Bangladesh, it was discovered that Community Health Workers (CHWs) are highly motivated when financial incentives are provided. The removal of financial incentives was found to have a negative effect on CHWs' desire to perform in three primary ways: a reduced willingness to work without financial compensation, a shift in pre- and post-intervention motivation, and challenges in household income due to dependence on the incentives. The removal of financial incentives was perceived to have negatively impacted the level of effort exerted by CHWs in four primary ways: 1) a reduction in CHW visits, 2) a decline in the quality of care provided, 3) CHW attrition, and 4) engagement in other income-generating activities as a substitution (Glenn *et al.*, 2021)

In a survey conducted in the Morogoro region of Tanzania, 96% of the 238 eligible Community Health Workers (CHWs) were included in the study. The findings indicated that respondents were primarily motivated to become CHWs due to altruistic reasons, such as working on Maternal, Newborn, and Child Health (MNCH), a desire to serve God, and a strong work ethic. Intrinsic needs, including helping the community, improving health, and a sense of pride, were also significant motivators, while external stimuli played a lesser role. CHWs expressed satisfaction with their relationships with health workers and communities, job aids, and their capacity to provide services. However, they reported dissatisfaction with communication devices, lack of transportation, and financial incentives that could facilitate their tasks. The factors influencing motivation and satisfaction did not significantly differ across CHW socio-demographic characteristics. However, older and less educated CHWs were more likely to be motivated by altruism, intrinsic needs, skill utilization, community respect, and hope for employment. Less educated CHWs were more satisfied with service and quality factors, and wealthier CHWs were more satisfied with job aids (Mpembeni *et al.*, 2015).

In a cross-sectional study with an analytical approach conducted by Bodiena Mwamba Guelor in 2018, on the analysis of the level of operationalization of the relay community in the Walungu learning and research health zone in South Kivu, DRC, showed that the community relays, as members of the CACs (community activity cells), had little involvement in the promotion of well-being, including the promotion of good nutritional practices, which are responsible for the high rate of morbidity and mortality linked to malnutrition in children under the age of 5 in this area, in addition to the other diseases identified during his study.
In this study, the author also showed the negative perception of community relays in pursuing activities at community level due to a lack of motivation and initiatives enabling them to play

their role properly, in addition to their No-involvement in certain lucrative activities from which the health zone benefits. Supervision strategies would be more necessary so that they can make a reasonable contribution to the response in the context of strengthening community care from which malnourished children would benefit. *(Bodiena Mwamba 2018).*

In a study carried out in South Kivu in 2023, on the implementation of a community-based nutritional approach during humanitarian crises and extended Lessons learned from the Democratic Republic of Congo (DRC), the communities had a poor perception of the malnutrition of their undernourished children. This was due to the stigmatisation of certain parents of undernourished children who did not appreciate the way in which the members of the Community Animation Cells provided this care at community level. According to the authors, these community members did not appreciate the way in which community workers treated malnourished children.

In terms of nutrition, there are many negative perceptions of malnutrition at community level. For example: malnutrition is a community curse, is a fish eaten, and is a transmissible disease leading to stigmatization. It is therefore understandable that community perceptions of malnutrition in children under 5 vary from stigmatization to indifference. Using a qualitative method, involving primary data collection and a literature review, a specific consideration linked to the direct involvement of the animation units in the improvement of the nutritional status of children under 5 would be an added value in the understanding of the contribution of these CACs within the framework of this study if their role was well defined in a specific way *(People in need , 2023).*

Nutrition practices of community animation cells.

The World Health Organization (WHO) has recommended exclusive breastfeeding (EBF) for the first six months after birth since 2001. Achieving universal coverage with general nutritional interventions, including the promotion of exclusive breastfeeding, has been estimated to potentially prevent 8% of child deaths under the age of 36 months and reduce stunting by 10-15% (Engebretsen *et al.*, 2014). It was also observed that practicing EBF for 6 months, as opposed to EBF for 3 to 4 months, resulted in lower diarrheal morbidity, prolonged lactational amenorrhea, and no clear infant growth deficit among infants in both low- and high-income countries.

In the Democratic Republic of the Congo (DRC), breastfeeding is highly prevalent at 95%. However, only 48% of children are breastfed within the first hour after birth, missing out on

the nutritional and immunological benefits of colostrum. Additionally, only 36% of children are exclusively breastfed for the first 6 months following World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommendations. Older children often receive only one meal per day. Poor breastfeeding practices may be linked to a high number of deaths from common childhood illnesses like diarrhea and pneumonia in the DRC. In South Kivu province, a significantly higher proportion of infants (40%) are fed something other than breast milk in the first 3 days compared to the national average (17.5%). Moreover, only 18% of infants aged 6 to 23 months in South Kivu have received a minimum acceptable diet of complementary foods, measured by minimum dietary diversity and meal frequency. While exclusive breastfeeding for the first 6 months is promoted by the DRC Ministry of Public Health, and education and support are provided to mothers during antenatal and postnatal consultations, more than one-third of women do not have access to a health clinic and, consequently, do not receive information on optimal Infant and Young Child Feeding (IYCF) practices (Burns *et al.*, 2016a).

In their study titled "Infant feeding practices and determinants of poor breastfeeding behavior in Kinshasa, Democratic Republic of Congo: a descriptive study," Marcel Yotebieng *et al.* noted that the DRC is one of the 13 countries that has not seen progress towards MDG 4. It bears the third-largest burden of child deaths worldwide, and its under-five mortality rate has remained high, increasing from 180 for every 1000 live births in 1990 to 170 in 2010. Although these deaths result from a complex web of determinants, there is enough evidence to believe that breastfeeding practices play a major role in the extremely high infant mortality in the DR Congo. Results from the 2007 Demographic and Health Survey (DHS) indicate that, of the 9.2% of infants who die before their first birthday in DR Congo, 4.2% die during the neonatal period, and the remaining 5% between 1 and 12 months. Additionally, of the 116 out of 1000 babies born alive in 2010 in DR Congo who survived through the first 28 days and subsequently died before their fifth birthday, 20 others died from diarrhea, and 23 from pneumonia, while malaria accounted for 28 deaths, and AIDS accounted for only 2. The higher number of deaths in the postnatal period and the predominant role of diarrhea, pneumonia, and malaria suggest that factors contributing to these deaths are found, among other sources, in feeding practices. In fact, by the age of 6 months, more than 10% of children in DRC are already stunted, almost 15% are underweight-for-age, and approximately the same percentage are emaciated. It was therefore concluded that addressing cultural beliefs, training healthcare providers adequately

on breastfeeding support skills, and providing structured breastfeeding support after maternity discharge is needed to promote EBF in the DR Congo (Yotebieng, *et al.,* 2013)

Despite advances in health and sanitation worldwide, diarrheal disease remains a leading cause of death among children under 5 years globally. The intersection of diarrhea and malnutrition has a serious impact, as undernourished children are more susceptible to infections, and children suffering from diarrhea are able to absorb fewer nutrients, contributing to malnutrition. This creates a vicious cycle where the two conditions exacerbate each other, posing significant health challenges for young children.

In the recent decade, diarrheal diseases were responsible for approximately 10% of annual deaths among children under 5 years in the Democratic Republic of the Congo (DRC). Additionally, 40% of children under 5 years in DRC are estimated to be stunted, with that number rising to 47% in rural areas. South Kivu province has the highest percentage of stunting in the country, with 53% of children being stunted. Interventions that can help reduce childhood diarrheal diseases, enteric infections, and stunting in rural areas of DRC like South Kivu are urgently needed (Kuhl *et al.*, 2021).

The Care Group Model, developed in the late 1990s by child survival staff at World Relief, is part of peer-to-peer education and support. The model relies on existing community relationships to disseminate information for health and nutrition communication programs. It has been implemented in 27 countries and has been shown to increase coverage of child survival programs and reduce under-five mortality rates.

In 2012, it was estimated that 6.6 million children under the age of five died worldwide, with eighty-two percent of these deaths occurring in Sub-Saharan Africa and Southern Asia. Thirty-three percent of these deaths were due to pneumonia (17%), diarrhea (9%), and malaria (7%).

Morbidity and mortality from common childhood illnesses can be significantly reduced if caregivers seek early and appropriate care. This ability of caregivers to recognize and seek appropriate care is crucial in achieving global health goals, such as the fourth Millennium Development Goal of reducing child mortality by two-thirds by 2015 (Geldsetzer *et al.*, 2014). Recognizing and addressing barriers to healthcare seeking and access is identified as a top research priority to reduce mortality from childhood pneumonia worldwide.

In the Democratic Republic of the Congo (DRC), it is essential for community health workers to raise awareness in the community about the importance of healthcare-seeking practices to

minimize child mortality, particularly due to malnutrition-related complications. Research findings indicate that community-based nutrition interventions, facilitated through community animation cells, have significantly impacted the nutritional status of under-five children in developing countries (Majamanda *et al.*, 2014).

In Brazil, the expansion of Community Health Workers (CHWs) over the past three decades has contributed to impressive health outcomes. The CHW program, with 222,280 CHWs, has played a vital role in achieving and surpassing child mortality targets. Brazil now exhibits low rates of underweight children, high immunization coverage, widespread access to prenatal care, family planning, and HIV prevention, as well as effective tuberculosis detection and AIDS medication coverage. Other countries, including South Africa, are adopting and adapting CHW programs based on the successful model implemented in Brazil (H. Perry & Zulliger, 2012).
Studies on their impact in community-based nutrition interventions, India indicated that CHWs Programme was effective in achieving significant improvements in breastfeeding and reducing childhood stunting. (Vir SC., *et al.*, 2014). More so, same studies in Kenya indicated that use of CHWs led to reduced prevalence of underweight children in the study population. (C. J. Sawe *et al.*, 2020)
In Mali, the package of interventions provided by community health workers goes beyond the diagnosis of malnutrition to include treatment. This comprehensive approach has led to impressive outcomes, with 95% of malnourished children treated by community health workers in the community successfully recovering. In comparison, 88% of those treated in health centers achieved recovery. These findings highlight the effectiveness of community health workers in providing successful treatment for severe acute malnutrition as part of the integrated Community Case Management (iCCM) approach (Basil *et al.*, 2022)

In a study by Kandala *et al.* in 2022 on Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): does geographic location matter? discussing the essential concepts of the nutritional status of children under the age of 5, these authors used data from the 2007 DRC Demographic and Health Survey (DHS-DRC). In their analyses, the authors stated that the children in their study had all the data relating to anthropometric measurements. As the study covered both rural and urban areas, malnutrition among children was more prevalent in rural than in urban areas. So child malnutrition is spatially structured. However, if these authors were to use a methodology involving Community Animation Cells in the various provinces covered by the study, the results could provide information on the

effectiveness of these members in applying advanced strategies for organising awareness-raising sessions on nutrition promotion, particularly in rural areas (Kandala *et al.*, 2011)

In this study conducted by Chloe Puett, the aim was to compare the cost-effectiveness of PCMA delivered by CHWs compared with hospital treatment of SAM. Their results show the added value of community-based management of severe acute malnutrition in children under 5 years of age by members of Community Animation Cells or community relays. The strong operationalization of CACs as part of their role can identify and admit children in a poor nutritional state before they develop complications, and at community level they can be treated effectively. The contribution of the CACs has been demonstrated in this study, although others should extend their studies to include case-control cohorts in order to determine the real factors involved. In the treatment of SAM through the intermediary of CHWs in the reduction of expenditure for children treated at community level than in hospital (Puett *et al.*, 2013)

Bisimwa Balaluka Ghislain, in his thesis study on the Prevention of Malnutrition in South Kivu (Democratic Republic of Congo): the role and effectiveness of community-based interventions, 2012, this study brought together several studies, three of which were quasi-experimental based on data collected by community relays, and two other observational studies which used qualitative methods to identify and discuss the incentives motivating community volunteers. All the studies showed the interest and added value of all the members of the Community Animation Cells , including the community volunteers or community relays, through their ability to mobilize people, but that this did not increase the obvious value of the incentives linked to their motivation and their involvement in lucrative activities carried out in the health zones. These studies have therefore shown that the community relays who are members of the CACs can also contribute to monitoring the growth of children under the age of five and to promoting exclusive breastfeeding in rural and urban areas, thereby helping to improve the nutritional status of these children under the age of 5.

2.2.2 Factors promoting effective implementation of functional capacities of CAC for nutritional status improvement among under 5 in South-Kivu-DRC

Community health workers (CHW) and volunteers (CHV) have been deployed globally as a local, low cost health resource in communities that have trouble in accessing the mainstream health services. Their involvement has been recently increasing since WHO started promoting

task shifting or the inclusion of more medical skills and procedures to CHW workloads *(H. B. Perry, Zulliger, & Rogers, 2014).*

To realize full potential of community animation cells in ensuring high nutritional status there are a number of activities that must be done for example education and training, community engagement, cultural sensitivity, empowerment among other activities.

For a community animation cells (or any health worker) to be productive, a number of broad-based and interrelated inputs are required. These include capacity that entails (knowledge, skills, and attitudes), being motivated, organizational support or resources, physical and social environment, working conditions. While the capacity and motivation (both extrinsic and intrinsic) to do the work are essential determinants of a CAC productivity *(Jaskiewicz & Tulenko, 2012)*

In a research study examining the impact of a Nutrition Education Intervention (NEI) specifically designed to mitigate vitamin A deficiency on the competencies and utilization of Community Health Volunteers (CHVs) in rural Nepal, it was observed that CHVs linked to the NEI demonstrated enhanced proficiency. They were better at identifying and addressing various common ailments, such as diarrhoea, night blindness, malnutrition, and acute respiratory infections, in comparison to CHVs who were not involved in the intervention program. During a two-year implementation period, this intervention integrated both preventive and remedial measures, operating within the established Primary Health Care (PHC) system and capitalizing on the expertise of Community Health Volunteers (CHVs) who had received training from the Ministry of Health and were actively engaged in their local communities. *(*Curtale*, et al., 1995)*

According to Journal of environmental and public health in Indonesia,(Sunjaya, Herawati, Indraswari, Megawati, & Sumintono, 2021) , prior training, CHVs exhibited limited proficiency in their skills, but after training, all participants demonstrated improvements in their abilities . Stacking analysis revealed that, on average, the skills of all CHVs in measuring infants and toddlers increased by 2.68 and 3.34 logits, respectively ($p < 0.01$). Racking analysis indicated a reduction in the perceived difficulty of all measurement items by 2.61 and 3.07 logits for infants and toddlers, respectively ($p < 0.01$). Hence it is essential to periodically update the capacity of CHVs to monitor child growth accurately.

Child malnutrition remains a challenge in most of the third world countries. In the paper “How Community Health Workers Can Improve Workforce Diversity and Dietary Outcomes”, it has

been highlighted that the need for nutrition educators is growing at a faster rate and this has caused shortages in the number of occupations like nutritionists. *(Burt & Sisselman-Borgia, 2020).* It suggests that the community health workers should be included and made racially/ethnically diverse so as to care for the ever-evolving client population. Evidence based approaches should be used to train and employ more culturally competent nutrition educators and increase the number of community health workers in nutrition programs. The community health workers are individuals with demographic evidence and experience similar to a program's client population (and/or area of focus) and who receive formal training in evidence-based practices to assist in the delivery of care. As such, CHWs provide culturally competent, tailored services such as case management, health education, and policy advocacy within communities *(Burt & Sisselman-Borgia, 2020).*

A study conducted by Sawe (2020) in Kenya on the "Impact of community health workers on the nutritional status and cognitive development of children under two years old" revealed that well-trained community health workers (CHWs), when adequately deployed, have the potential to enhance children's nutritional status and cognitive development by imparting essential information during training sessions. The availability of an adequate number of CHWs is also crucial for achieving nutritional objectives. The study used a quasi-experimental study design with secondary baseline data collected from World Vision database and end line data collected and analyzed. The study findings showed that the presence of CHWs led to reduced prevalence of the underweights in the study settings *(C. Sawe, 2020).*

In a study conducted in Zambia evaluating nutritional status among under 5 following training of CHVs, it is essential to provide community-based volunteers with training that tailors their Information, Education, and Communication (IEC) materials and delivery methods to the specific requirements of individual communities. The research adopted a Quasi-experimental study design, employing intervention and control groups. The study observed a significant enhancement in the knowledge levels of CBVs, shifting from a baseline mean of 5.62±2.3 to a post-intervention mean of 9.06±0.9, where $t(4) = 14.29$, $p < .01$. Trained CBVs effectively delivered selected IEC messages, resulting in a substantial improvement in the health status of children under five within a nine-month period. In terms of nutrition status, among the total under-five attendances, children with a Z score below -2 decreased from 1.27% to 0.27% in the intervention site and from 1.12% to 1.08% in the control site. *(Ndayambaje, Chanda, & Tadepalli)*

In a recent research assessing the influence of community health volunteers' empowerment, there was a moderate supply of remote diagnostics and medical kits that improved service delivery, along with sufficient transportation available for responding to emergency situations in the community. Under resource mobilization, there was no adequate funding from the relevant government entities that facilitated health service delivery. The researcher recommended regular replenishment of supplies, medicines, and equipment since when the health facilities run out of supplies, the patients are not able to afford from the chemist and private facilities *(Kamau, 2020).*

In a study done in Tajikistan on Volunteer Community Health and Agriculture Workers led by volunteer community health workers and community agricultural workers through home visits, community events, and peer support groups proved successful in improving nutrition of children. *(Yorick, et al., 2021).*The Community Volunteers were engaged whereby the management conducted comprehensive selection and training processes and supported volunteers in their work through monthly peer-learning sessions at the district level and regular supportive supervision visits at the community level based on the volunteers' needs. An initial training for Community Health Workers over five days on all relevant topics was done and all volunteer trainings were participatory, combining development of practical skills with acquisition of new knowledge.

Another study in Kenya on the factors influencing the performance of community health workers in Nandi Hills Kenya by Francis (2015), conducted a mixed method study from 87 community health workers. The findings show that there is a strong correlation (0.799**) between health system factors and performance of CHWs. Further, the findings show that there is strong correlation (0.777**) between economic factors and performance of community health workers and also shows that there is a strong correlation (0.775**) between environmental factors and performance of community health workers. It recommends that there should be improved staffing of the facilities where community units are linked in order to strengthen referrals and linkage systems especially taking into consideration the spatial distribution and population density. This will improve support supervision from CHEWs to CHWs during their community work *(Ngeny, 2015).*

According to Tanzania Connect Project "Child survival impact of adding paid community health workers to an existing facility", there is need for a holistic and co-operative approach to create effective solutions. To support the CHA, Connect developed supervisory systems,

launched information and monitoring operations, and implemented logistics support for integration with existing district and village operations. The district and village authorities have been instrumental in facilitating the CHA introduction and mediating any problems or challenges encountered. The engagement for the referral planning has provided a solid foundation for ensuring the relevance of strategies to local conditions.*(Ramsey et al., 2013)*

According to (*Woldie et al., 2018),* the performance of CHVs could be strengthened by regular supportive supervision, in-service training and adequate logistical support, as well as a high level of community ownership. In addition, success requires careful implementation, strong policy backing and continual support by their managers.

Yorick 2021, in a study conducted in Tajikistan, highlighted that on average, each CHW visited 20 households per month. They specifically targeted households with children under 2 years and children with malnutrition or other known medical conditions, low-income households, incomplete families, and households with pregnant women and newlyweds to counsel them on antenatal care and nutrition for pregnant women and young children. The study findings indicated that CHWs were not able to regularly cover all 100 households they were assigned. Their coverage depended on their communication skills and ability to step outside of their comfort zone to work with those difficult and less welcoming households. The identification rates of children with signs of malnutrition by CHWs during their regular work were lower than those observed during the growth monitoring and promotion campaign. Noetheless, it is essential that regular growth monitoring and promotion campaigns conducted by community volunteers and government health workers become routine practice, as this will contribute to a decrease in malnutrition rates. *(Yorick et al., 2021)*

In a cross-sectional study based on routine program data of CHVs serving the catchment of Bwindi Community Hospital, Kanungu District, South Western Uganda, in 2014 and 2015, information was collected on individual socio-demographic and workplace characteristics of the CHVs. Of the 508 CHVs 37% took care of more than the recommended 20–30 households which led to reduced overall performance (aOR: 0.6, 95% CI: 0.4–0.9, P = 0.02). It was concluded that being responsible for a larger number of households than the recommended guideline resulted in decreased CHV performance, whereas receiving additional refresher training sessions was linked to enhanced performance. To ensure the continued effectiveness of CHVs as a crucial component of universal health coverage, it is essential to address the factors that are known to influence their performance.

In Uganda, in an article “working with community health workers in improving maternal and new born health outcomes”, challenges included dissatisfaction with the quarterly transport refund of 6 USD and lack of means of transportation such as bicycles. The intervention had two main components: community mobilization and sensitization, and the health provider and management capacity building for better quality services. The community mobilization and sensitization strategy involved the use of CHWs and radio talk shows. However, the CHW training and supervision models require strengthening for improved performance. Local solutions regarding CHW motivation are necessary for sustainability.*(Namazzi et al., 2017)*

In general, the volunteer work undertaken by Community Health Volunteers (CHVs) is unpaid and often clashes with their economic pursuits, childcare responsibilities, and community obligations. Furthermore, the absence of supervision, work plans, and adequate training hinders the effective delivery of CHVs' services to the community. To address these challenges, it is crucial to consider compensating CHVs for their efforts and offering essential support in the form of foundational training and capital for entrepreneurial endeavors.

2.2.3 Achievement of effectiveness of the functional capacities of the CACs

There is evidence that community Animation cells activities are effective in improving population health in various countries. Unfortunately, they are still often considered as second-class, temporary solutions. However, the evidence increasingly demonstrates that they are now essential elements of population-based programs that improve health outcomes, even in high-income countries. When community Animation cells are appropriately selected, trained, and supervised, and when they are provided with appropriate supplies, medicines, and equipment, they can improve key health-related behaviours, extend the accessibility of key services, and strengthen linkages between communities and health services hence the community animation cells should become an integral part of health systems as they strive to improve their quality, coverage, and impact on population health *(Perry, et al., 2014).*

Research shows that, there are still challenges to community-based programs and interventions for malnutrition many of which require context-specific solutions and a dramatic increase in funding. Well-trained, supervised volunteers and full-time community Animation cells (CAC) who receive regular payment, or a combination of both, are more likely to engage the community in grass-roots health-related empowerment. Programs that utilize minimal

economic incentives to part-time CACs tend to limit their focus, with financially incentivized activities becoming central *(Singh, et al., 2015).*

Community animation cells also need to be adequately equipped with the supplies they need to treat malnutrition, which may still be the problem leading to huge malnutrition incidences in spite of their existence. Systematic review findings on the effectiveness of approaches to managing MAM and SAM according the WHO protocol in developing countries showed that globally, knowledge on the management of acute malnutrition is either focused on specific population groups; specific interventions or there is discrepancy in the definition of undernutrition and types of therapeutic or supplementary foods. The reviews further acknowledged the need to comprehensively review the current evidence for the effectiveness of various community- and facility-based strategies to identify and manage MAM and SAM, including the community-based screening, identification management of SAM and MAM, relative effectiveness of RUTF for SAM and RUSF for MAM, effectiveness of prophylactic use of antibiotic to manage uncomplicated SAM, and the effectiveness of vitamin A supplementation to manage children with acute malnutrition (Lenters *et al.*, 2013)

In her research, Soo Hyun Yu *et al* had shown the weakness of mothers in the practice of exclusive breastfeeding due to the absence of family support and this unfavourable perception which would be applied by the low involvement of the members of the community health workers in the various awareness and/or sensitization sessions in order to follow good practices in terms of breastfeeding and complementary food for children under 5 years of age in the context of preventing and combating malnutrition in children under 5 years of age in the regions concerned by their study. However, if the operationalization of these support groups for good nutritional practices were to be taken into account in this research using a cohort study, their contribution to the coverage of ANJE(in full) programs in north-west Syria, which remained low according to the study, would be understood *(Yu, Mason, et al., 2016).*

The national iCCM strategy in the DRC is an equity-based approach to fight both child illness and undernutrition. In December 2005 the Ministry of Health initiated iCCM for childhood illness, with a keen interest on treatment of malaria, acute respiratory infection, diarrhoea, and acute malnutrition within national iCCM implementation guidelines developed in 2007 with updates to policy in 2016 (). The policy development could help in improving the effectiveness of the CAC activities and help improve the nutrition status if it receives enough backing from all the stakeholders.

A study by Mbala *et al.* (2018) conducted in the Democratic Republic of the Congo (DRC) aimed to investigate the impact of community health volunteers on child health, with a particular focus on their potential to drive improvements in nutritional status. The study design was a community-based cross-sectional survey, and the findings revealed a positive association between the presence and active involvement of community health workers and improved child health outcomes, particularly in terms of nutritional status. Communities with active engagement of CHVs exhibited higher rates of appropriate nutrition practices, timely vaccinations, and increased awareness of proper infant feeding practices. The community practices, attitudes and perception played a bigger role in the implementation of the programs which posed as a challenge in the guideline Implementation by the CACs *(Mbala et al., 2018).*

However, there is a lack of evidence on beliefs, understanding and perceptions related to infant and young child practices, child illness, and care-seeking behaviors, as well as the advice on nutrition and child illness, provided by health providers and key influential community members, which can inform on strengthening nutrition within iCCM in the DRC health system (MCHIP, 2012). It has therefore been highlighted that there is a need for community participation in health programs such as iCCM towards malnutrition management in children under 5years in the Democratic Republic of Congo due to the identified lack of access to information on good nutrition practices by the community, lack of effective training on health preventive and promotion services to enable community participation, poverty of the inhabitants mostly, which has experienced political instability and war that has resulted into high rates of stunting and child mortality like in South Kivu with limited access to healthcare (Kavle *et al.*, 2019).

It is also reported that, the emergency, following the socio-political unrest that the country has been experiencing since 1990, has led to the introduction of humanitarian interventions, an approach that has been essentially selective to health problems and more of curative than preventive and promotive (General Secretariat of the DRC, 2012). Further findings show that, there is lack of information by the community on the Complementary feeding practices which are weak, with small amounts of food fed, limited dietary diversity and lack of information on meal frequency among others, which can be taught throughout the community by health workers if adequately trained and their capacity to involve community animation cells participation, is built to counsel on preventative aspects of nutrition/IYCF which is crucially needed in strengthening the nutrition elements in the children under five (Issa, 2023)

A pre- inquiry short verbal survey carried in Bunyakiri Health Zones indicated that at least three quarters of the respondents who were majorly members of CAC, responsible of some humanitarian organizations, Ministry of Health agreed to the fact that community participation is still at its low in relation to the implementation of Heath actions mostly in health prevention services that could see reduction in malnutrition cases hence reduced mortality rates, community participation organs, the upright selection of the community members, low participation in health interventions by all actors, No-compliance with guidelines or the strategic plan for community participation; which would require interventions at all levels of decision-making and health interventions (Personal communication , 2022). Hence, the need for research study to ascertain the Effectiveness of Community Animation Cells in Improving Nutritional Status of Children under 5 Years Old.

In the light of all the above, all these authors and the existing review, the involvement of community participation bodies (CACs through community relays) was shown to be a cornerstone in overall health interventions and in the fight against malnutrition in pregnant and breastfeeding women, as well as in children under 5. The operation of community animation cells did not emerge as a specific component of improving the nutritional status of children under 5, but rather as a community-based body contributing to the promotion of activities within the framework of the use of health services by households and mothers of children under 5.

The notions of active screening and community monitoring in the support of the response to the treatment of malnutrition at community level has not met the attention of several authors and existing theories at the level of the Bunyakiri health zone, It is in view of this chronicity of malnutrition in the health zone that this study aims to understand the level of CAC capacity to respond to the nutritional status of children under 5 years of age in the Bunyakiri health zone, targeting certain health areas where the households and the center in charge of malnutrition are located. Health areas where households and centers are receiving new cases beyond the efforts deployed by the government and implementing partners located in the health zone since 2015 with an intervention applying community approaches in the prevention and treatment of this scourge.

2.3 Summary

2.3.1 Introduction

Community Animation Cells in the Democratic Republic of Congo (DRC) are an essential part of the country's health system, comprised of community health workers dedicated to promoting public health in local level. These individuals serve as a vital link between healthcare providers and local communities, working to improve health outcomes by providing services and information directly to the people they serve. It is made up of all the active forces including religious and opinion leaders and delegates from community-based organizations, water-hygiene and sanitation committee, etc. They conduct regular meetings and engage with community members to discuss health issues, identify needs, and facilitate community-driven solutions. Through these interactions, they gain valuable insights into prevailing health challenges and community-specific concerns, enabling the tailoring of interventions to suit the local context effectively.

The capacities of Community Animation Cells extend to a comprehensive understanding of community health dynamics. They are a total of 12 per health village and are equipped with knowledge of local health issues, preventive measures, and basic healthcare practices. These health workers provide education, conduct health assessments, and offer guidance on healthy behaviors. Their ability to effectively communicate and engage with diverse community members, even in remote or underserved areas, further showcases their capacity to bridge the health information gap.

Motivation among Community Animation Cells is bolstered by various factors. Recognizing their contributions and valuing their efforts instills a sense of pride and dedication. Providing regular training opportunities continuous professional development and the provision of incentives for their economic needs ensures that they stay informed about the latest healthcare advancements and remain enthusiastic about their role. Additionally, a supportive work environment that appreciates their challenges and encourages collaboration amplifies their motivation and effectiveness.

Effectiveness in CACs is nurtured through several key principles. Firstly, building trust and fostering strong relationships within the community is crucial. Open communication, empathy, and respecting cultural norms ensure that the community health workers are accepted and trusted. Moreover, embracing a participatory model of engagement, where community

members actively contribute to decision-making processes, enhances ownership and commitment to health initiatives

2.3.2 Theoretical Propositions

The effectiveness of Community Animation Cells (CACs) in fulfilling their functional capacities during implementation hinges on several key components. Perception, practices and knowledge of the community animation cells as well as the factors that promote the effective implementation of functional capacities of the CACs. Community engagement and participation serve as foundational pillars, ensuring active involvement and ownership of health initiatives within the community, developing interventions to the specific needs and cultural contexts of the community enhances their relevance and impact, transparency, open communication and trust-building between CACs and the community foster strong relationships, enabling a conducive environment for health promotion. Equipping CACs with comprehensive training and knowledge about local health issues and practices enhances their credibility and capacity to deliver accurate information and services. Additionally, providing opportunities, acknowledging their efforts, and promoting collaborations for growth sustain motivation and dedication is vital for sustained effectiveness in their vital role within the healthcare system.

2.4 CONCEPTUAL FRAMEWORK

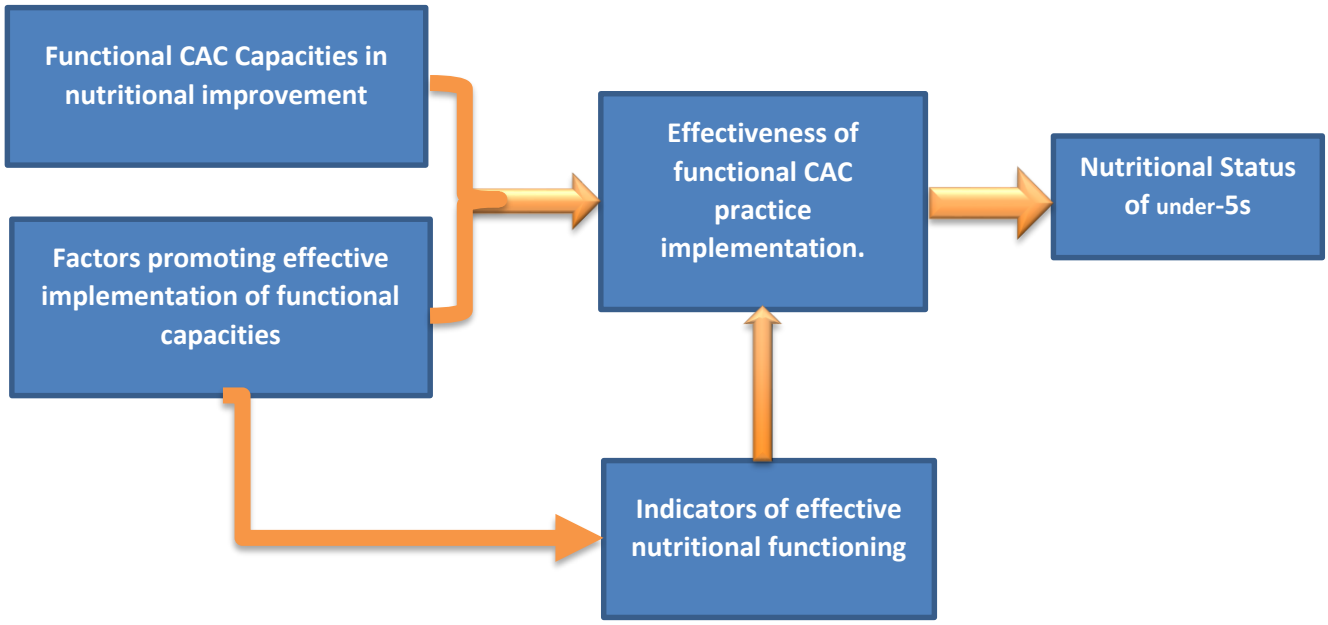


Figure 2.1. Conceptual framework.

This figure shows the link between knowledge attitudes and practices, factors associated with the functional effectiveness of as well as the functional effectiveness indicators of the members of the CACs with their functional effectiveness in improving the nutritional status of children under 5 years of age in a theoretical way .

2.5 OPERATIONAL FRAMEWORK

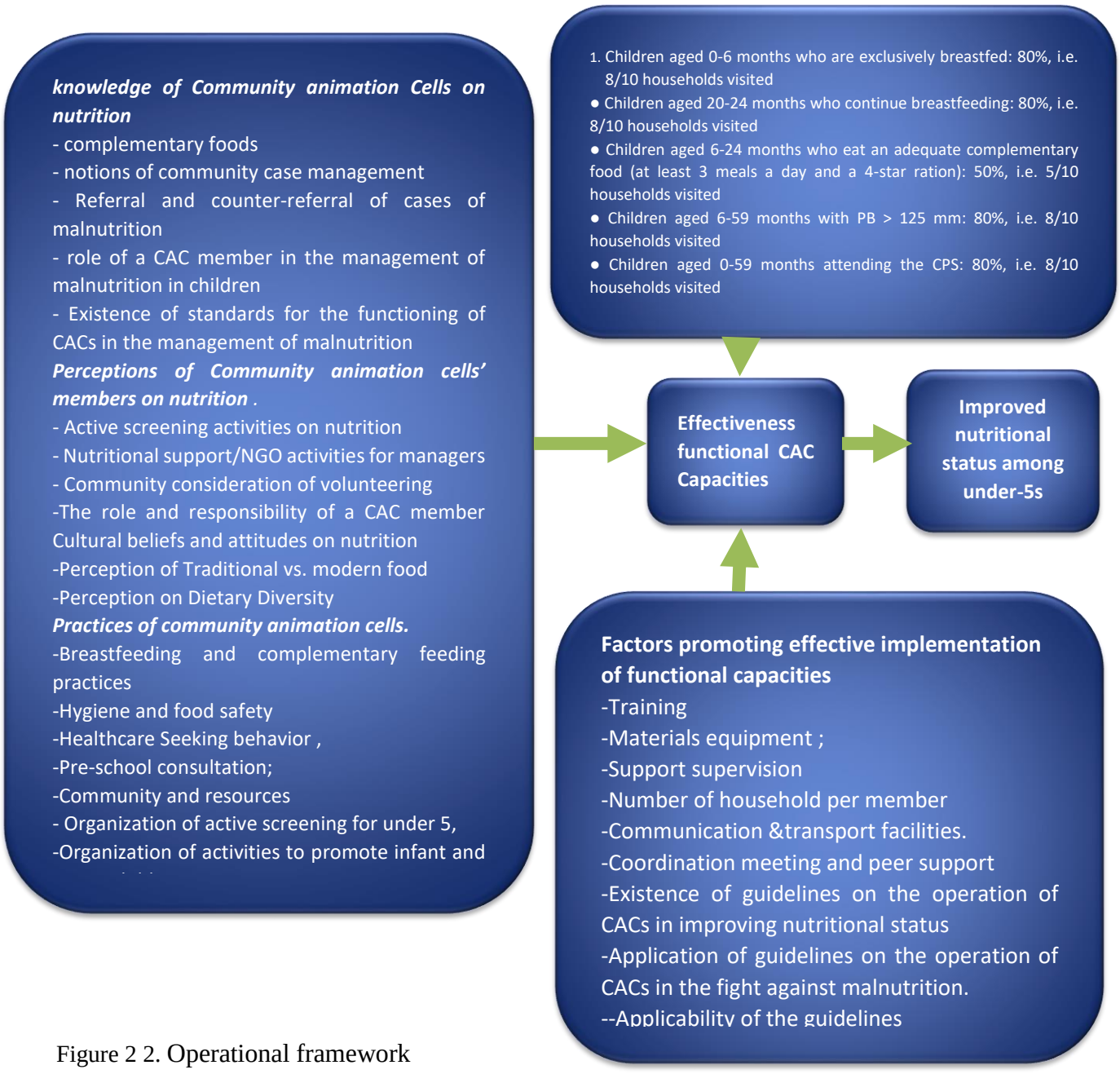


Figure 2 2. Operational framework

This figure provides information on the different variables related to the knowledge, perception/attitude and practices of CACs and households on the functional effectiveness of CACs, the associated factors and the related effectiveness indicators in improving the nutritional status of children under 5.

CHAPTER THREE: METHODOLOGY

3.1 Background of study area

In this section, a brief presentation of the Bunyakiri health zone in Kalehe territory, South Kivu Province will be made, starting with the delimitation, the socio-cultural situation and the demography.

3.1.1 Delimitation of the research health zone

Bunyakiri Rural Health Zone is a beneficiary of the healthy Village and Schools program and is located in Kalehe Territory. It is limited: to the North by Iteberro Health Zone; to the South and South East by Miti-Murhesa Health Zone; to the South-West by Kalonge Health Zone; to the East by Kalehe Health Zone, Bushaku and Shicha chandjofu peaks, and Minova Health Zone by Bulaisa mountain range; and at to the West by Mulungu Health Zone.

Particularly for the 2-health area of the intervention study: Tshigoma heath area is limited to the north by Kachiri health area; to the south by Mushunguti health area, to the East by Ramba HA and to the West by Makuta HA. Bunyakiri heath zone is also limited to the north by Bitobolo HA, to the South by Muoma HA , to the East by Chiriba HA and to the West by the hill of Chisasa.

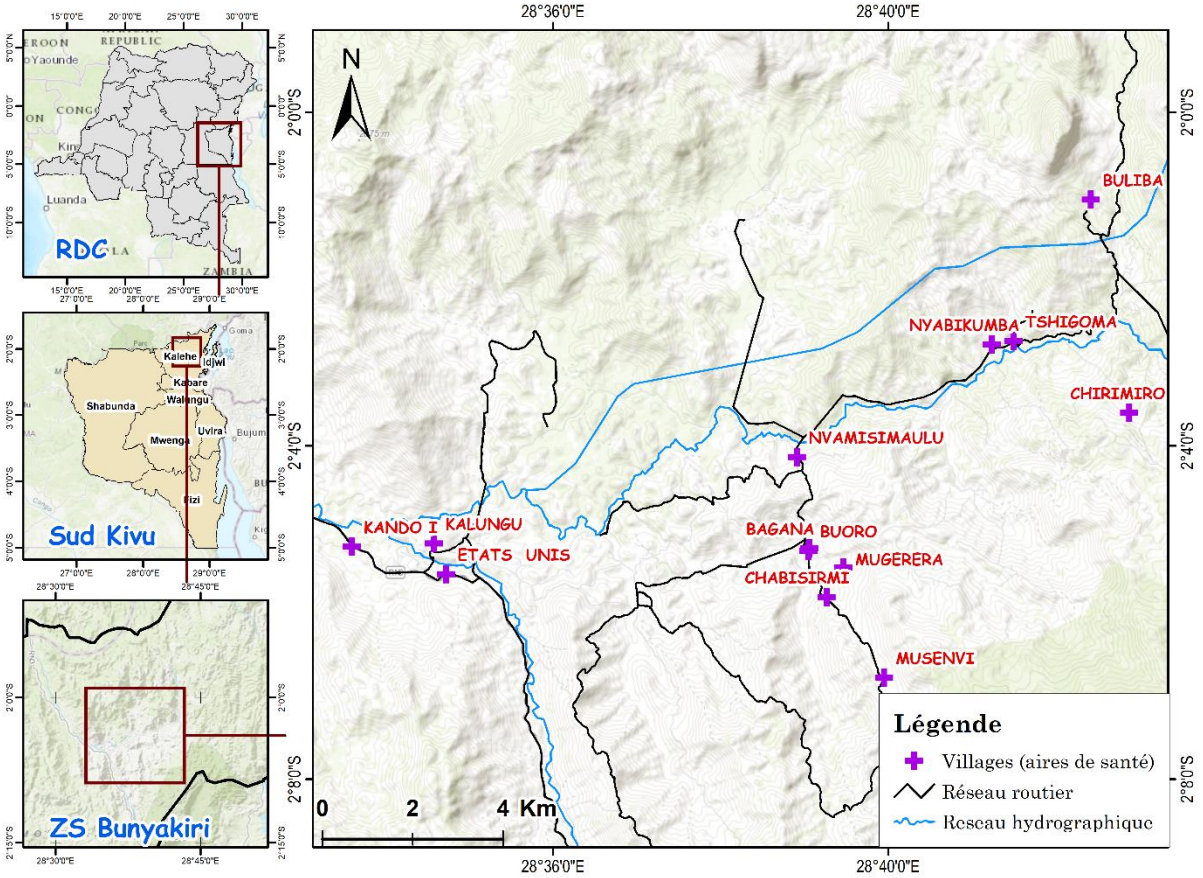


Figure 3.1. Location of the Bunyakiri health zone (Villages in the Bagana health area as the control zone and Bunyakiri- Tshigoma as the intervention zone)

This study was focuced in three health areas of the Bunyakiri health zone: Tshigoma heath area and Bunyakiri as intervention and Bagana health zone as control .

Thus, the choice of these health areas was motivated, on the one hand, by the performance of the CAC members in their activities to improve the nutritional status of children under five through community activities, in the case of Bagana health area, and, on the other hand, by the fact that in Bunyakiri and Tshigoma health areas it was easy to find villages without dynamic, less organised or low performance CACs and where the nutritional status of children was alarmingly poor.

Bunyakiri Health Zone, the climate is warm in the center and at the north, but cold in the south and southeast because of the extension of Kahuzi-Biega Mountain range; the relief is made of hills and mountains, interspersed with valleys in the central part of the health Zone; the soil is clay-sandy and fertile by nature; Bunyakiri Health Zone usually experiences 2 seasons throughout the year: A short dry season from the second half of June to August and a long rainy season from September to mid-June. This situation is the same in the two targeted heath area which are Tshigoma- Bunyakiri and Bagana .

3.1.2 Geographical situation

The climate in Bunyakiri Health Zone is warm in the center and north, but cold in the south and south-east due to the extension of the Kahuzi-Biega mountain range; the relief is made up of hills and mountains, interspersed with valleys in the central part of the health Zone; the soil is clay-sandy and naturally fertile; Bunyakiri Health Zone usually experiences 2 seasons throughout the year: A short dry season from the second half of June to August and a long rainy season from September to mid-June. This situation is the same in the two targeted zones which are Tshigoma-Bunyakiri and Bagana

3.1.3. Socio-cultural Situation

In Bunyakiri Health Zone, the population often returns to traditional medicine, where practices such as tattooing and uvula cutting on children are recorded. Such practices can facilitate the transmission of HIV/AIDS. Habits and customs lead people to resort to prayer rooms, where sick people who have come in the belief that only prayer will heal them end up in hospital in a very serious condition. The main religions are: Catholic (38%) and Protestant (25%). Languages and dialects spoken are Swahili, French, Kitembo, Mashi and Kirega. Polygamous marriages are common practice. Sex outside marriage is tolerated for husbands but not for wives. A woman's status depends on her status as a married woman, and girls tend to marry

young. It is generally considered more important to ensure the education of the boys than girls. The socio-cultural situation is common to the health sector within the Bunyakiri health zone.

3.2 Research Design

3.2.1 Study design

This is a quasi-experimental study and was carried out in three stapes/phases , the baseline, an intervention and endline.

a. Baseline

In the first phase/stape, a baseline survey was conducted inm Tshigoma , Bunyakiri and Bagana areas. The baseline survey focused on the required standard feeding practices adopted by the CACs to achieve adequate nutritional status of children under 5 years of age. However, the choice of these health areas is linked to both the characteristics of the study areas and their nutritional status at community level, with Bunyakiri and Tshigoma presenting a bleak nutritional picture in line with the criteria of a village with community nutrition supported by CAC members, and the targeted villages of Bagana health area presenting community nutrition activities with advanced improvement supported by CAC's members activities at community level . In addition to this, Bunyakiri and Tshigoma are among the health areas with poor CAC performance, while Bagana is among those with good performance.

b. Intervention

In the second phase of this study, an experimental device was designed and monitored, targeting CACs and the households of children under 5 to investigate the effectiveness of the functional capacity of Community Animation Cells in improving the nutritional status of children under 5 years of age in Bunyakiri Health zone, South Kivu-DRC (Doocy *et al.*, 2019; Mutea *et al.*, 2019; Sawe, 2020). Two groups of the CAC members constituted the experimental design. The first group considered as the intervention team received training on the nutrition key issues in addition to FIP: SPC; Wash; and infant and young child nutrition (ANJE) by the support of the gorvenment office of nutrition in South Kivu ; That team benefited also with some materials and equipment (reporting tools, backpacks, mackintoshes, notebooks, cases as part of their CAC work) for a supervision. The second group was constituted by CAC members who did not receive any training, nor materials, equipment or supervision. It was considered as the control group. An endline survey was conducted after 3 months. Data were called from the two groups for the analysis and comparaison.

As part of this study, two CACs were monitored, one in the Bunyakiri 'Etats-Unis' health area and the other in the Tshigoma 'Nyabikumba' health area, because it was in these CACs that children under 5 years of age were found to be in a critical situation with poor nutritional status in relation to the performance indicators, despite the presence of CACs, although their functionality was not good enough- hope you measured the functionality. However, an observation was also made in 6 villages/CACs in Bagana health area, where an improvement in nutritional status associated with the dynamic performance of the CACs had been observed. Monitoring was therefore carried out for 3 months, i.e. from February to April 2024, in accordance with the minimum standards for setting up a CAC. Shortly afterwards, these two groups were compared in terms of the functional capacities effectiveness as CACs and their contribution to improving the nutritional status of children under 5 through community activities based on their responsibilities and roles. This three days of training course took place face-to-face, involving all the interviewers and supervisors, to ensure a fluid understanding of the tools, roles and responsibilities, monitoring and techniques support…based to the official curriculum. However, during the intervention the following conditions were made available to the study participants:

1) For the members of the CACs: a) 4 days of training on nutrition issues and CACs roles and responsibilities to with functional capacities. During the training, they received transport reimbursement fee, accommodation and foods. b) donation of working materials (briefcase, boots, mackintosh,…), c) availability of working tools for the CACs , including those to be tested , d) monthly running costs to facilitate for operationality of the work ; e) Home visits were organized every day according to the program of each team, which was shared out among the members of the CACs. Screening and referral sessions for cases identified in the community were also carried out.

2) For households: a) Provision of vegetable seeds through the CACs to create community fields, b) Provision of IGAs in terms of guinea pigs through the CACs; each household was mobilized to have a plot of land and to breed small livestock for the nutrition of children and pregnant and breastfeeding women, etc.

3) For the health Central Office team, through the community facilitator: a) Provision of tools for testing and improvement during the process, b) support through monthly motivation for monitoring and supervision of activities, d) provision of tools and working materials. At least two supervisory visits were planned and carried out by the community coordinator in the health

zone, and three joint visits with the research team were organized during the intervention period.

4) Monitors assigned to the communities for monitoring during the intervention: a) provision of working tools and materials management, b) monthly payment for monitoring activities. The role of these supervisors was to monitor and support the CACs in their role and responsibilities in order to be aware of what was happening in the practical life of households in relation to the subject of the study. They were based in the CACs/villages concerned by the intervention.

5) Support for the people in charge of community dynamics from heath centers in the study areas: a) provision of work tools and materials for monitoring and supervising activities b) granting of expenses for monthly monitoring of activities. They carried out close monitoring. Contacts and sharing experiences,

6) Study supervisors: a) set up tools and materials to facilitate the monitoring and supervision of the intervention in the areas concerned b) allocation of monthly fees/motivation was also done. They organized three joint visits with the health zone and the health centre to see how the intervention was progressing. Three programmatic monthly visits to each study area, c) Support meetings with the heath zone and health area community dynamic teams;

Endline

As for the base line, I collected data in the two zones control and intervention using the same tools and to the same person/group. Which data allowed to make comparison in each group/Zone and for the two zones.

3.2.2 Study Population

The Bunyakiri Health Zone has an estimated population of 292280 inhabitants as per 2022 census spread over an area of 4229 km2, or an average density of 55 inhabitants per km2 (ZS Bunyakiri report, 2022). This population is distributed proportionally by age groups and by pregnant women as follows: 0 to 11 months: 9289 people, 12 to 59 months: 39923 people, 0 to 59 months: 42743 people, Pregnant women: 10647 people. Bunyakiri Health Zone has a high incidence of malnutrition as per government reports and has not shown significant changes despite attempts by different stakeholders (Democratic Republic of Congo, 2019; IPC, 2023; Maciejewski, 2020; UNDP, 2022). The age distribution children under 5 years of age in the Bunyakiri health zone in 2022 was as follows: 1.79% (n=5,241) aged 0 to 6 months, 1.89% (n=5,533) aged 0 to 59 months, 0.72% (n=2,130) aged 0 to 23 months, 0.51% (n=1,510) aged

6 to 23 months and 1.68% (n=4,920) aged 6 to 59 months (Health zone report, 2022). Tshigoma had 8170 population and 1389 household when Bunyakiri 7969 population and 1504 household and Bagana 9863 population 1860 household.

3.2.3 Target Population

This study involved members of the CACs (Community Animation Cells) in Bagana, Tshigoma and Bunyakiri health areas in the Bunyakiri Health Zone, Kalehe territory in South Kivu, DRC. For the household surveys, the target population included families and households with children under the age of 5 living in the specified areas of Bunyakiri Health Zone. This includes parents, family members or anyone responsible for the welfare care and nutrition of children in this age group.

3.3 Sample Size Calculation and Sampling Technique

3.3.1 Sample Size Calculation

Sample Size Calculation for Household Members of children under 5 years

In this study, a total sample of 280 participants, members of households of children under 5 years of age was selected. The sample size determination was done using a sample formula for cluster randomized trials and a design effect was included to account for the inter-cluster correlation coefficient. It provides a balance between statistical power and practical limitations, ensuring sufficient data for analysis and interpretation (Democratic Republic of Congo, 2019);

3.3.2 Sample Size determination and Sampling Procedures

To calculate the sample size, the sample size estimation formula will be as was applied by Charan and Biswas (Charan & Biswas, 2013)

$$n = \frac{2(Z_{\alpha+}Z_{\beta})^2 P(1-P)}{(D)^2} * DE$$

$$n = \frac{2(1.96 + 0.84)^2 0.48(1 - 0.48\,)}{(0.3)^2} * 2.45 = 107$$

Where:

n = Required sample size

$Z_{\alpha/2}$ = Standard normal deviate for α (1.96)

Z_{β} = Standard normal deviate for β, 80% power = 0.84

P= Proportion of children with malnutrition in South Kivu; 48% (Nguyen *et al.*, 2023)

D- Expected moderate effect size, assumption of 30%

DE= 1 + (m-1) rho where m is the cluster size of the clusters (30), rho is the intra cluster correlation coefficient, usually 0.05.

DE= 1 + (30-1)0.05 = 2.45

An addition of 30% of the sample size will be added to cater for No-response in the study.
107 + (30% * 107) = 139.1 and we thought it useful to round up for convenience, so 140 participants per site. For the purposes of this study, we considered a moderate expected effect size with an assumption of 30%. This made it possible to add a 30% supplement to the sample size (107) to account for non-responses to the study. This gave us 140 child households to survey per zone (140 in the intervention zone and 140 in the control zone), which makes 280 for households surveyed in both zones (control and intervention).
For reasons of convenience, this sample was increased to 140 per site, i.e.140 households in Bagana and 140 households in Tshigoma and Bunyakiri, making a total 280 households with children under the age of 5 interviewed during the study.
To select the members of the CACs to be interviewed, 60 members were randomly selected from the 12 villages involved in the study area, with 5 members selected from each of 12 villages.

3.3.3 Sampling Technique

Village selection: first, villages in the Tchigoma and Bunyakiri health areas were purposively selected on the basis of various reports (OCHA, 2023; Syahrial et al., 2019; Yuan, Williams, & Man, 2014). The three villages selected in Tshigoma and Bunyakiri respectively were characterised by low nutritional performance indicators (high level of malnutrition incidence) resulting from poor CAC performance, while the villages in Bagana were characterised by good nutritional indicators (BCZ report, September 2023). Secondly, simple random sampling was used to select villages in the Tshigoma and Bunyakiri health areas that served as intervention sites and received CAC training, equipment supply and supervision, while randomly selected villages in the Bagana health areas were considered as control sites. Two health areas were targeted to take account of the spillover effect, and we purposely selected villages that were as far apart as possible.

The households included in the study were selected at random from the villages identified, which we surveyed to obtain the results of objectives 1, 2 and 3 at the start of the study and which we followed up until the end of the study in order to obtain the results of objective 3 at the end of the study during the intervention.

Table 3.1. Breakdown of the sample by health area and targeted villages.

Case						
Health area	*Sample*	*Village names*	*Total population*	*Number of households*	*Households to be surveyed*	*a survey step*
Bunyakiri	140	ETAS-UNIS	1000	182	34	5
		KALUNGU	472	86	15	
		KANDO 1	1154	210	39	
Tshigoma		NYABIKUMBA	461	84	16	
		CHIRIMIRO	637	116	21	
		BULIBA	456	83	15	
		TOTAL	**4180**	**761**	**140**	
Health area *Witnesses*	*Sample*	*Village names*	*Total population*	*Number of households*	*Households to be surveyed*	*a survey step*
Bagana	140	BUTUTA	735	134	19	7
		NYAMISIMAULU	823	150	21	
		MUGERERA	1241	226	32	
		CHABISIMI	691	126	18	
		MUSENYI	1186	216	31	
		BU'UORO	746	136	19	
		TOTAL	5422	988	140	

To determine the number of households to be surveyed per village, we used the proportionality coefficient, which was 140: 761 = 0.183968 for Case intervention households and 140: 988 = 0.1417 control households. This helped us to calculate the number of households to be surveyed in each village/CAC in the health areas targeted by the study.

It should be noted that for the purposes of this study, the 6 villages in the health areas of Bunyakiri (3 villages/CAC) and Tshigoma (3 villages/CAC) health areas (At the start of this study, according to a baseline study, these villages/CAC had a reasonable number of cases of increased malnutrition in children under the age of 5) and the 6 other villages in Bagana health area (at the start of this study, these villages/CAC had reasonable number of cases of malnutrition in children under the age of 5).

a) Selection of CAC members: Stratified random sampling was used to select the villages from which the CAC members to be interviewed were randomly selected.

b) For this study, all the CAC members included in the study were exhaustively selected based on the list of all the CAC members in each village with their phone numbers and physical addresses in their villages. This list, which was available from the CODESA (Health Development Committees) chairpersons at the Bunyakiri, Tshigoma and Bagana health centers,

was used to meet them and interview them on the subject of the study. Focus groups were organized in each village/CAC in the health areas covered by the study.

Table 3.2. Distribution of CAC members by health area and targeted villages in the Bunyakiri health zone.

Targeted health areas	Number of CACs/villages targeted	CAC members
Bunyakiri	3 CAC	3 villages/CAC x 12 committee members =36
Bagana	6 CAC	6 villages/CAC x 12 committee members =72
Tshigoma	3 CAC	3 villages/CAC x 12 committee members =36
Total	**12 CAC**	12 villages/CAC x 12 committee members =144

For this study, we conducted 12 focus groups made up of 12 members from each village/CAC. For individual interviews, a simple random selection was made in each village/CAC in order to select 5 members for a total of 60 CAC members to be interviewed individually.

Selection of the key informants: The sample was exhaustive as it included all the organizations working in the health sector in South Kivu/DRC (one manager or delegate per organization was interviewed) as key informants. Humanitarian Coordination (OCHA) and the Nutrition Cluster were consulted to identify those supporting health systems in the DRC, particularly in South Kivu, which enabled them to be contacted for the study. We then contacted UNICEF, WFP, DDC, FAO, TPODRC and MDA for various interviews related to the study.

For the health authorities, all health zone managers (Chief of the health zone, the executive team), were included in the study since they are responsible for CODESA.

I had a total of 10 people, including 3 full nurses and 3 assistant full nurses and 1 doctor in charge of the health zone, 1 CD (Head of the Provincial Health Division), 1 expert nutritionist on the national nutrition program at the Provincial Health Division, 1 Head of Department at the General Secretariat for Health in Kinshasa (National Program of Nutrition).

3.4 Data Collection Procedure

The data collection procedures used in this study to collect information on the effectiveness of the functional capacities of CAC in improving the nutritional status of children the under 5 in South Kivu-DRC were as follows: *identification of study participants*, the obtaining of

informed consent from the study participants and data collection using *semi- structured questionnaires or guides*. During the informed consent process, the study participants were informed of the purpose of the study, the risks and benefits of participation, and their right to refuse or withdraw from the study at any time. This was done because it is a research ethical requirement and it is morally justified.

For the Key informant interviews, a guide was administered to the CAC members to assess their knowledge and perception on nutritional issues of the under 5-year-old. An In-depth interview guide was also administered to the household members to find their in-depth view on the subject matter of nutrition after them signing the consent forms.

A 24 focus groups discussion was also conducted with the household members to obtain their general input on the level of Knowledge, perception and practice on nutritional matters that are the key elements for the effectiveness of the CAC activities. The focus group discussions was conducted by trained research assistants and audio-recorded with the participants' consent.

In the first phase, we collected data on the nutrition knowledge, perceptions and practices, as well as data on factors associated with under-five malnutrition, and reviewed indicators of the performance of CAC work in improving the nutritional status of under-five children. All this data was collected through household questionnaires, individual interviews and focus groups with members of the CACs and health authorities, nutrition partners, donors and technical and financial partners.

The second phase was the intervention, it concerned the data linked to the second (to improve information from baseline) and third objectives, which was carried out on the basis of the performance indicators, established CACs functional capacities of improved nutritional status in determining their effectiveness in improving the nutritional status of children under 5 years.

3.5 Inclusion and Exclusion Criteria for the baseline survey

3.5.1 Inclusion Criteria

a. baseline data collection

The inclusion criteria for selecting household members to participate in the study included families residing within the targeted communities in Bunyakiri Health zone. Specifically, households with children under the age of five was considered for inclusion.

Generally, the following criteria was taken in account in this study:

a) To have been a career in the household aged 18 or over,

b) To have been present on the day of the survey,

c) To have been a family member,

The following criteria were adopted for CAC members:

a) To have been a member of a CAC in the villages targeted by the study

b) To have been present on the day of the survey and to have agreed to answer the questions.

b. Qualitative survey

For the qualitative surveys, the following criteria were used for the various focus groups and individual interviews:

To have been a technical and financial partner in the implementation of health programs in the targeted health zones,

To have been a donor in the nutrition and CAC support sector.

Have been a member of the outreach units that are active in the health zones targeted by the research.

Have been in charge (IT/ITA) of a health centre responsible for managing cases of malnutrition and malnutrition-related illnesses.

3.5.2 Exclusion Criteria

a. Quantitative cross-sectional survey

Household members was excluded from the study if they decline to participate or withdraw consent during the course of the study was excluded. The Community Animation Cell (CAC) members was excluded if they are not actively engaged in CAC related activities within Bunyakiri Health zone. Individuals who were previously involved but are no longer active during the study period was also be excluded. Additionally, those members who decline participation or are unable to provide informed consent was excluded from the study.

b. Qualitative survey

Was excluded in this study :

a) All Titular Nurse/Titular Nurse Assistant (health centers managers in Bunyakiri health zone) not belonging to the health areas targeted by the research;
b) All donors and technical and financial partners who are not involved in the field of nutrition and who do not support the establishment and/or revitalization of CACs.
c) Any CAC or group of households not available during the focus group session and having refused to participate in the interview or focus group) Any member of the government working in the field of nutrition but not available during the interview.

3.6 Data Collection Tools

Quantitative data was collected digitally using semi-structured questionnaires pre-loaded on smartphones. The KOBO Collect application was used on Android smartphones with custom-designed forms adapted from the physical data forms. To ensure data security, the collected information was securely transferred to a KOBO Collect-supported cloud server on a daily basis, and once the data was securely transferred, the survey records were immediately deleted from the Android tablets All uploaded data was encrypted and password protected to ensure confidentiality.

Qualitative data were collected using the Key Informant Interview guide, the in-depth interview guide and the focus group interview guide. The KII guide was administered to the CAC staff, the IDI (In-depth-Interview) guide was administered to the household members and the focus group guides were used on the household members. The guides were provided with open-ended questions aimed at exploring their knowledge and perceptions, giving a broader understanding of why the situation is as per the current statistics.

3.7. Recruitment, Selection and Training of Data Collectors

a. Quantitative baseline survey

The process commenced with an extensive recruitment drive, reaching out to individuals possessing a keen interest in public health, nutrition, and community engagement. Given the context of the study in Bunyakiri, a region characterized by unique socio-cultural nuances, a strong focus was placed on individuals with prior experience in community interactions.

Preferred candidates as those who brought an understanding of the local customs, languages, and societal dynamics. The selection of data collectors was a rigorous process, combining a comprehensive review of applications, structured interviews, and reference checks. The candidates was assessed on various parameters, including their academic background, relevant experience, community engagement history, interpersonal skills, and their capacity for ethical conduct.

During the interviews, candidates was probed about their understanding of child nutrition, experiences in community involvement, and potential challenges they envisioned during data collection. References was contacted to validate the information provided and gain insights into the candidates' suitability for the role.

Selected candidates was undergo an intensive training program designed to empower them with the necessary knowledge, skills, and tools for efficient data collection. The training have

ensured a deep dive into the research objectives, the study protocol, and the specific methodologies to be employed.

Ethical guidelines have emphasized, stressing the importance of informed consent, privacy protection, and respect for participants. Data collectors were trained on the utilization of data collection tools, including survey questionnaires, and was acquainted with various techniques to ensure unbiased and accurate data gathering.

Practical exercises, such as role-playing and simulations, was employed to simulate data collection scenarios, allowing data collectors to familiarize themselves with the process and refine their communication skills. Furthermore, field practice under supervision was provide a hands-on experience, instilling confidence in the data collectors before the commencement of actual data collection. As part of this process, 15 interviewers was recruited and distributed among the targeted villages in three targeted health areas in the Bunyakiri health zone; they must hold a degree (BAC+5) in nutrition, public health, community health, rural development or any other similar field.. In order to ensure the quality of the data collected in the field, 2 Master's level survey supervisors (in public health, community health with experience in the field of nutrition and community involvement) was also recruited to monitor and guide the surveyors during data collection in the 3 health areas of Bunyakiri, Bagana and Tshigoma in the Bunyakiri health zone in South Kivu.

b. Qualitative baseline survey

However, for the qualitative research, the approach was as follows: research supervisors and assistant monitoring officers were selected, and data collection tools were trained and updated. This team was responsible for conducting focus groups and individual interviews with members of households and Community Animation Cells , members of the health zone management team and managers of health facilities (Bagana, Tshigoma and Bunyakiri). This process was directly supervised by the principal researcher, who was also part of the field data collection team.

3.8 Data Quality Control and Management

3.8.1 Pilot Study

A pre-study was carried out prior to the launch of a full study. A small sample size was selected in the Muoma and Chinganda health areas, and all the procedures and processes that would be followed during the real study were followed during the pilot study. The process and results of the pilot study merely provided a glimpse of the real situation at the study site through the data collected, information on interviewees, the cost of the study and expected difficulties. It also allowed us to test the tools, the feasibility of the study and to identify any unforeseen study difficulties. The same tools as in the real

study were used to collect the data, and these were analyzed using Stata, SPSS, ENA, generating descriptive statistics and associations. Data from the pilot study were not used in this study.

3.8.2 Data Validation and Verification

A system of close supervision and quality control was implemented throughout the data collection process. Supervisors regularly reviewed the data collected, checking forms for completeness, accuracy and adherence to protocols.

3.8.3 Double Data Entry

Once the data collection had been completed, a double-entry system was used to process the data. Data were entered into a database independently by two people, and any discrepancies between entries were reconciled by referring back to the original forms. This procedure increased the accuracy and reliability of the data. The forms were confidential and no information was shared with anyone other than the research team. After the data entry, a cross-verification was also carried out to identify any outliers or inconsistencies in the dataset. Anomalies were flagged for further investigation and resolution. This process of cross-verification helped to identify potential errors that may have been missed during initial data entry.

3.8.4 Version Control

Each change made to the dataset, whether in terms of input, cleansing or validation, was assigned a unique version number and timestamp. This meticulous documentation provided a comprehensive understanding of the evolution of the dataset over time. Any changes made were accompanied by a clear record of the reason for the change, to maintain transparency and accountability in the handling of the data.

In addition, a master record was maintained, detailing all versions, changes and their respective justifications. This register serves as a comprehensive reference and allows for quick retrieval of specific versions when required. The version control system ensured the accuracy and reliability of the datasets.

3.8.5 Data Back-up

Regular backups were scheduled at predetermined intervals to ensure that no critical data was lost. These backups included all parts of the dataset, including raw data, processed data and any changes made during the course of the study. The backup repository was securely hosted on reliable and redundant servers, using encryption measures to preserve data confidentiality and integrity. A designated team was tasked with managing and monitoring the backup process, to

ensure efficiency and rapid recovery in the unlikely event of data loss. This meticulous data backup strategy ensures the security, availability and consistency of all data.

3.8.6 Data Management

Data quality control and management are critical aspects of any research study, including the evaluation of community participation in strengthening the primary healthcare system in the unstable South Kivu. Effective data quality control and management procedures help ensure that the data collected is accurate, reliable, and consistent. Here's how data quality control and management was achieved.

Data Cleaning: After data collection, a thorough data cleaning process was performed to identify and correct errors, missing values, and outliers. Data cleaning ensures that the dataset is of high quality and ready for analysis.

Data Security and Confidentiality: Data management have prioritized the security and confidentiality of the data. Measures such as password protection and restricting access to data have been implemented to protect information. .

Data Coding and Categorization: Data was coded and categorized appropriately for analysis. Clear guidelines and a codebook have developed to ensure consistent coding practices.

Documentation: Comprehensive documentation of all data-related activities, including data collection procedures, data cleaning, and analysis decisions, was maintained. This documentation ensured transparency and facilitated future data sharing and verification.

For the management of certain confounding factors during the data analyses, potential factors were identified that could disrupt the association between certain independent and dependent variables in this study. A variable was considered to be a confounding factor if it was related to the functional capacities of the CACs (as exposures) studied and if it was associated with improvements in the nutritional status of children under 5 in the unexposed. It is possible to control for this confounding factor in the planning of the study and in the analysis of the data in this study.

3.9. Data Analysis Plan

The processing and analysis of the quantitative data collected in this study on the effectiveness of functional capacities of animation cells' practices on improving the nutritional status among the under 5 in South Kivu-DRC was involve the following steps: data entry, data cleaning whereby collected data were checked for completeness, consistency, and accuracy addressing the missing values and outliers appropriately. Data processing and analysis of the quantitative data was done using R Studio 4.2.2 software, SPSS V. 27. ENA for Smart 2011, were analyzed manually in use after there was a problem in recognising certain local languages, especially

those of some of the interviewees in the audio recordings made with the Dictaphone (the tool used to collect the qualitative data) and data kept confidential and only accessible to the research team. Here are statistical tests that were applicable to address specific objectives:

To assess the functional capacities of Community Animation Cells for nutritional status improvement among under five in South Kivu-DRC.

A ***descriptive analysis*** was carried out to summarize the various measures of the study participants' knowledge, perceptions and practices with regard to nutrition. Frequencies and percentages were calculated and a ***chi-square test of*** association was performed to check the association of these variables with the dependent variable of nutritional status. In other words, we used the test when we realized that we had counts of values for two categorical variables. The chi-square test of independence in this study checks whether two variables (dependent and independent) are likely to be related or not. We have a count for two categorical or nominal variables. We also have the idea that the two variables are not related. The test gives us a way of deciding whether our idea is plausible or not. Thematic coding was undertaken to identify emerging themes, concepts and models on factors related to CACs and household members. Data were classified according to themes, sub-themes, verbatims and relevant concepts, which facilitated the systematic organization of qualitative information on the variable.

To determine the factors promoting effective implementation of functional capacities of the Community Animation Cells for nutritional status improvement among under five in South Kivu-DRC.

A ***descriptive analysis*** was conducted to summarize the different variables on the functional capacities of the CACs: training, skills, supervision, availability of materials and equipment, facilitation of communication and transport, availability of reporting structures. A bivariate analysis was performed to compare the independent variables of the factors favoring effective implementation (e.g. training) with the outcome variable of nutritional status, using the ***chi-square test*** to check the association. Variables with a significant p-value (< 0.05) were passed to multivariate analysis using a binary logistic regression model since the outcome is binary. In other words, we used the test when we realised that we had counts of values for two categorical variables. The chi-square test of independence in this study checks whether two variables (dependent and independent) are likely to be related or not. We have a count for two categorical or nominal variables. We also have the idea that the two variables are not related. The test gives us a way of deciding whether our idea is plausible or not. For qualitative data, thematic coding

was undertaken to identify emerging themes, concepts and patterns about the CAC and household members. The data was classified according to relevant themes, sub-themes and concepts, which facilitated the systematic organization of qualitative information on the variable.

To test the level of achievement of effectiveness of the functional capacities of the Community Animation Cells in improving the nutritional status of children under five in South Kivu-DRC.

Baseline and endline data were collected at both control and intervention sites from household participants with children under 5 years of age. Different analytical approaches were followed and used to determine the net change in outcome between the intervention and control groups at baseline and endline. Baseline difference=intervention-control; Endline difference=intervention-control; DID net change=$Difference_{endline}$ - $Difference_{baseline}$

Regression analysis for objective 3

The primary outcome is the effect of CAC intervention on the nutritional status of the under 5. Other study outcomes include knowledge, perception and practices towards the CAC activities. The net effect of the intervention will be calculated as adjusted prevalence rates (aPR) with 95% confidence intervals. A Poisson model will be applied using Generalized Estimating Equation (GEE) to account for clustering at health area level. Chi-square test will be done for socio-demographic characteristics, knowledge, attitude and perception of the household members of the under 5 children at baseline. The variables that were statistically significant at baseline were included in the regression model. In other words, we used the test when we realised that we had counts of values for two categorical variables. The chi-square test of independence in this study checks whether two variables (dependent and independent) are likely to be related or not. We have a count for two categorical or nominal variables. We also have the idea that the two variables are not related. The test gives us a way of deciding whether our idea is plausible or not. The model is specified as: $Y=B_1$(study arm) $+B_2$(Period)$+B_3$(Interaction)$+B_4$ (X_1) $+B_5(X_2)$ $+B_6(X_3)$; Where; Study arm (intervention=1, control=0); Period (Endline=1, baseline=0); Interaction=Study arm * Period X_1, X_2, X_3= Significant Socio-demographic characteristics/Knowledge/Perception/Practices. SPSS version 27 software was used for the analyses and modelling. *For the qualitative data* such as audio files from interviews and FGDs, they was transcribed accurately and in details then taken through analysis. Thematic coding was undertaken to identify emerging themes, concepts, and

patterns in the data. The data was categorized based on themes, sub-themes, and relevant concepts, facilitating a systematic organization of qualitative insights. The researchers had then cross verify coded data independently to ensure consistency and accuracy in coding and regular team meetings was held to discuss and resolve any discrepancies or differing interpretations. Thematic analysis was used to identify, analyse and report patterns in the data, focusing on recurring themes, concepts, verbatims and variations in responses, before carrying out a comparative analysis.

However, to categorize the nutritional status of children under the age of 5, we used anthropometric measurements among the children, and households in which children were found to be suffering from severe or moderate acute malnutrition were directly considered to be households with children of poor nutritional status, which would indicate that the village's Community Animation Cells had poor functional capacity, Households in which the children did not show signs of malnutrition after anthropometric measurements were taken were considered to be households with children of good nutritional status, which would indicate that the functional capacities of the CACs in the villages were good.

3.10. Method for Results Presentation

This study presents its findings using a structured and comprehensive approach. The presentation begins with a clear description of the study population, focusing on the demographic details of the children and families involved in the study.

This is followed by an overview of the results of the study, which are presented in the form of double-entry or cross-tabulated tables for data relating to CACs and household members in relation to, on the one hand, the nutritional status of children under 5 and their determining factors and, on the other hand, data relating to the functional efficiency of CAC members. These results were presented on the one hand in relation to Baseline analyses and on the other hand in relation to Endline analyses,

The presentation was concluded with a discussion of the implications of the results, highlighting the potential of CACs as a community-based strategy for improving nutritional outcomes among the vulnerable population of children under 5 in South Kivu-DRC. In addition, recommendations for future policy and interventions were formulated, aimed at contributing to the improvement of child nutrition in the region.

3.11. Ethical Considerations

The following ethical considerations were taken into account. The study received ethical approval from the University Ethics Review Committee, the South Kivu Transitional

Authorities, local community leaders and stakeholders. Informed consent for the study was obtained from the participants; the consent form was written in a language that the participants could easily understand, and they were informed about the purpose of the study, procedures, risks and benefits, and the confidentiality of their data: The responses collected were kept confidential and anonymous to ensure the privacy and dignity of the participants. The data were only accessible to the research team. Participants were treated with respect and dignity throughout the study and were given the opportunity to withdraw from the study at any time without negative consequences. Pictures/photos was take after authorization not only for taking them but also for using them in the report. The data collected was only used for the purposes of the study and any data sharing was done in a way that ensured the privacy and confidentiality of the participants.

3.12 Study Limitations and Risk Analysis and Mitigation

The study recognizes the risk of sampling bias as it relies on available data and volunteers, who may not accurately represent the whole population. Efforts have been made to mitigate this risk by ensuring that the sample is diverse. There is a possibility of selection bias in the recruitment of participants due to preferences or predispositions. Random selection and strict inclusion criteria are used to minimize this bias. The accuracy and reliability of the data is affected by recall or reporting bias, particularly in relation to dietary habits and care-seeking behaviors, but this has been addressed through appropriate training of data collectors and cross-checking have been carried out. In addition, several confounding variables independently influenced the nutritional status and the work of the CACs. Multivariate analysis was carried out to account for and mitigate these effects.

Plans were in place to deal with unexpected events, such as data loss, equipment failure or delays. Regular back-ups, redundant data storage and access to technical support are in place. A designated qualified team monitors the progress of the study and assesses compliance with the research plan. Regular review meetings ensure that any deviations are identified and prompt corrective action was taken. All data was anonymized and stored in secure, password-protected databases. Access is limited to authorized personnel. The study anticipated challenges related to transport, communication and accessibility in the study area. Alternative communication channels and local partnerships are being used to mitigate these challenges. Extensive community engagement was undertaken to ensure understanding and cooperation. Regular dialogues and information sessions are being organized to address concerns and build trust within the community, in order to promote active participation and support for the study.

Chap 4. RESULTS

Objective 1. Results related to objective 1. To assess the functional capacity of community animation cells to improve the nutritional status of children under five in Bunyakiri health zone in South Kivu DRC

4.1. Analysis of the functional capacities of CACs at community level

At the start of the study, the observed difference in the level of functional capacities of the CACs in improving the nutritional status of children under 5 in the two study areas was significant [OR=1.9(1.0-3.4), p=0.039]. (**Table 4.1**).

Table 4.1 Performance level of CACs

CAC functional capacity	Control	Intervention	Total	OR(95% IC)	p-value
Good functional capacities	37(26,4)	22(15,7)	59	1.9(1.0-3,4)	0.039
Poor functional capacities	103(73,6)	118(84,3)	221		
Total	**140**	**140**	**280**		

4.2. Indicators for monitoring the performance of the CACs at village level in the health areas.

The results show that the level of functional effectiveness of the CACs was good in the control zone, whereas in the intervention zone, this functional capacity was weak in relation to the performance indicators assessed at the start of the study (**Table 4.2**).

The qualitative results of the individual interviews with the key informants revealed that the framework for the effectiveness and performance of the CACs could be summarized as follows: in the manual or guidelines available from the Ministry of Health, performance indicators can be used to assess the CAC in terms of its involvement in the implementation of its activities, and how it has fulfilled its tasks and responsibilities in the fight against a disease, in this case malnutrition in children under the age of 5. However, this point of view was not unanimously shared by the same group of participants, some of whom felt that the CACs were not effective, particularly given the prevalence of malnutrition, to which they were supposed to make a significant contribution as part of community-level activities. The level of effectiveness also depends on the nature and consistency of the support that the CAC can provide in terms of motivation; the effectiveness of CACs therefore depends on the financial and material motivation of their members to enable them to function properly and carry out their work. These factors have too great an impact on the effectiveness of these members because they are not taken into account by the various players. The few resources allocated are often poorly managed

and do not even allow members to access them. (To the fund intended for them). What's more, the fact that a member of a CAC is a role model at community level, his or her actions in terms of raising awareness of behaviour change linked to nutrition and other key themes make him or her more effective and efficient in his or her work. The data is confirmed by the following statements:

'We need to see the number of children aged 0 to 6 months who are exclusively breastfed, i.e. > 80%, the number of children aged 20 to 24 months who continue to breastfeed, the number of children aged 6 to 24 months who consume an adequate complementary food, i.e. > 50%, the number of children aged 6 to 24 months who consume an adequate complementary food, i.e. > 50%. 50%, the number of children aged 6-59 months with a BP > 125mm, the number of children aged 6-59 months attending the SPC, and add the proportion of pregnant women who have complied with the ANC and the proportion of pregnant women who have consumed an adequate complementary food, the proportion of pregnant adolescents who have consumed a 4-star food, etc. ' and *'the number of women who breastfeed within one hour of giving birth, and raising women's awareness of infant and young child feeding'. He added that 'the way CAC members are trained, the package they have and the way they are constituted could play a development role in the fight against the many fatal diseases that affect children'*. Statement by a nutritionist from the DPS-SK.

'...if a CAC member has his own plot of land and raises small livestock as a model...he can invest a lot of time in promoting and raising awareness among other community members', said a member of the Bunyakiri ECZ.

'I can say that it is difficult to say that the CACs are effective because there are no tools and there is no trend towards the persistence of malnutrition in the zone ... due to poor supervision of these CAC members'. said a member of the health zone management team.

' . Imagine how an organization can set aside time in a project to give money to the CACs, but in practice you end up with crumbs, and another stinging example is a project here at home, where the CAC members had gone to show the private fish ponds as their support to defend a partner and show that they were highly motivated, but curiously they were not, which would even justify the inefficiency of these members to provide a valid response to the needs of their community, being their representative. ....' said an official from the Bunyakiri BCZS.

Table 4.2. Evaluation of indicators for monitoring the performance of CACs in improving the nutritional status of children under 5 (Situation at the start of the study)

Indicators	Zone	Target/ Performance	Expected targets February 2024	Target Achieved February 2024	%
Children 0-6 months exclusively breastfed	Intervention zone	80%	42	20	47,6
	Control zone		162	131	80.7
Children aged 20-24 months who continue to breastfeed	Intervention zone	80%	45	13	28,9
	Control zone		82	43	35,26

Children aged 6-24 months consuming an adequate complementary food (at least 3 meals a day and 4-star ration)	Intervention zone	50%	84	35	47,6
	Control zone		112	59	52.7
Children aged 6 -59 months with PB > 125 mm	Intervention zone	80%	153	80	52,3
	Control zone		113	71	62,8
Pregnant and breastfeeding women who have received a 4-star diet (frequency and variety)	Intervention zone	80%	143	26	47,6
	Control zone		161	134	83.2
Children aged 0 -59 months attending CPS	Intervention zone	80%	370	35	9,5
	Intervention zone		312	64	20,5

4.3. Household knowledge of the functional effectiveness of CACs in improving the nutritional status of children under 5 years of age

The results in ***Table 4.3*** and ***Table 4.4*** show that the functional effectiveness of the CACs in improving the nutritional status of children under 5 was linked to the fact that households knew that breastfeeding should be continued for children aged 20 to 24 [OR=0. 1(0.9-0.6), p=0.013]; household heads' knowledge of exclusive breastfeeding for 6 months [OR=2.1(1.1-3.7), p=0.014] and households' knowledge that children should eat 2 to 3 times a day [OR=2.2(1.2-3.8), p=0.004].

However, during the focus groups and individual interviews, the results show that : The important benefits of breastfeeding for children's health and well-being are highlighted by community members, emphasizing points such as optimal child health. Community members point out that breastfeeding provides infants with the nutrients and other essential elements needed for healthy growth and development. As one community member explained: It helps to reduce the risk of illness. In the practice of breastfeeding, mothers generally breastfeed their children for up to 6 months and sometimes up to 7 months. The evidence shows that lack of food is a factor in child malnutrition in the Bunyakiri community. As far as the importance of breastfeeding is concerned, it has been shown that breastfeeding is important for every child. This is why community members are aware of the need to breastfeed their children for the first five years of their lives. This period of exclusive breastfeeding is particularly crucial for the health and survival of children. They also point out that breastfeeding promotes growth and development and protects children against disease. The different opinions of community members highlight the multiple benefits of breastfeeding for children's health and development, particularly during the first six months of life. They point out that breastfeeding is a protective factor for the child and recognize the benefits of breastfeeding that extend beyond the first six

months, in addition to a diversified diet, although this is still a major challenge in the communities.

The following opinions illustrate these results:

"It contributes to the child's good health and growth" (Declaration by a control zone participant).

"Breastfeeding brings good health for the child, it starts from 0 to 6 months, and it contributes to the child's growth. Another adds: *"Breast milk should be given at 6 months, to protect the baby and keep his body safe, even at 7 months. After 6 months, he can already take boiled food"*. Declaration by a intervention zone participant.

"The importance of feeding a child during the first five years is reflected in the rapid development of the child and its evolution in all areas." However, it also helps the child to find his appetite throughout his life on this earth (Bunyakiri). *It also helps the child to find its appetite throughout its life on this earth*. Declaration by a control zone participant.

Breastfeeding practices and complementary feeding in the community

Premature, prolonged introduction of No-maternal foods **:** Breastfeeding is important for every child who wants to grow on all levels (emotional, psychological, social and physical). For this reason, community members are aware of the need to breastfeed their children for the first five years of their lives. The members of the community agree that nutrition plays a vital role in a child's first five years: From these explanations, we understand that food plays a vital role in protecting the child against disease and contributes to the child's good health during the first five years. Some report the introduction of food or porridges as early as 2 months, because of the perception that this promotes growth or soothes crying. By way of illustration, the following statements illustrate the parents' concern to give food in a hurry. In addition, other statements show some variation in the duration and importance of food for children, depending on the year:; Community members provided information on the length of breastfeeding practised, in terms of years, with significant variations between mothers. The duration of breastfeeding varied: participants reported breastfeeding until their next pregnancy, 3 years, 2 years, and sometimes for a shorter period. However, focus group participants also reported that stopping breastfeeding following a new pregnancy was common practice. Economic insecurity is mentioned as a reason for the premature introduction of food, with mothers seeking to space out feedings so that they can go about their subsistence activities. By way of illustration, a member of the community speaks out:

"The importance of a child's diet in the first five years can be seen in the rapid development of the child and its evolution on all levels. But it also helps the child to find his appetite throughout his life on this earth". Declaration by a intervention zone participant.

"That's why I can say that nutrition over the last five years is important because it protects the child and brings about changes in the child's development". Declaration by a control zone participant.

"Sometimes, when we find a child who is not satisfied with breast milk, we are obliged to give him food to avoid disturbing him" (Declaration by a control zone participant). "*I feed my children quickly, even when they are 2 months old*". Declaration by a intervention zone participant.

*"For me, it's at 6 months to help them grow up safely" (*Declaration by a control zone participant). *"Some mothers also give food after 3 months" (*Declaration by a control zone participant). And others add that boiled food is considered an experimental start with light foods: *"First he takes his mother's milk and after 6 months he takes boiled food" (*Declaration by a intervention zone participant).

*"Yes," "for me it's until I get pregnant again", some after 3 years. 2 years. Many wait two years to conceive another child. Some mothers say they don't know" (*Declaration by a control zone participant*).*
. "For lack of means, we give it before the food so that we can look for ways to survive". Declaration by a control zone participant.

- **Supplementary feeding for children aged 6 to 24 months.**

Focus group participants revealed feeding practices for children (6 to 24 months) that raise nutritional concerns and raise questions about food security in the community. Their diet is inadequate and monotonous, meaning that foufou seems to be the staple food for most children, often supplemented by bananas, potatoes and, in some cases, animal proteins. The diversity and frequency of meals appear to be limited, failing to meet the full nutritional needs of growing children. In addition, the members of the community present the impact of economic insecurity as a determining factor in the frequency and quality of the children's meals. It is also important to point out that community members also show a divergence in feeding practices in terms of the age at which complementary foods are introduced and the composition of meals, reflecting individual approaches and contextual influences. Some community members mention the introduction of food as early as 4 months, often out of necessity to allow mothers to work. However, the analysis highlights the difficult socio-economic context that influences feeding practices. Targeted interventions are needed to promote healthy and diversified infant nutrition, while taking into account the realities and constraints of the community.

The following evidence illustrates this*:*

"The basic food is fou, from 6 months to 12 months it's foufou and that twice, banana, potato, and sometimes once a day. However, the frequency is 2 times for the majority and it depends

on whether they can afford it". Declaration by a control zone participant.

"For me, it's three times because that's what the members of the community relay told us". Declaration by a intervention zone participant**.**

*"Life is hard here at home, if it's already 6 months old, they can start eating, we give them everything we have at home and we do this three times" (*Declaration by a control zone participant).

"Each mother has her own way of taking care of her child, for me it's at 4 months, I leave him to allow me to work and at that moment I give him food" Declaration by a intervention zone participant.

Factors contributing to poor nutrition:

Lack of financial resources among community members: Parents' lack of financial means is a major factor contributing to poor nutrition among children. Parents' inability to meet their children's basic dietary needs leads to poor-quality, inadequate food. In addition, community members have also shown that the lack of suitable space for cultivation is the main factor contributing to poor nutrition in the community, in the sense that agriculture occupies a primordial place in this community. The ability to grow fresh, nutritious food is essential to ensure a healthy, balanced diet for community members. However, the lack of places to grow food leads to a shortage of nutritious products, increasing the risk of malnutrition among children. Access to these factors therefore requires financial resources, without which it is difficult to achieve. The opinions expressed by community members highlight the crucial role of financial resources in the fight against malnutrition in the community.

"The lack of financial means to feed the children in the family leads to poor nutrition for the children". Declaration by a control zone participant.

"The lack of places to grow crops can contribute to poor nutrition in the community and a lack of food for community members" Declaration by a intervention zone participant.

- Lack of information and ignorance among community members about types of food

Community members report that a lack of knowledge about healthy and nutritious eating practices for children leads parents to make inappropriate food choices for their children. The lack of understanding of the different food groups and their essential roles in nutrition limits the variety and quality of children's diets for parents. *experience, he can already take porridge*" Declaration by a intervention zone participant.

Community members' lack of information and ignorance about the types of food they eat encourages a cycle of malnutrition, which can have harmful consequences for children's health and development. Alongside poverty, which limits community members' access to nutritious food, pushing them to opt for cheaper but less nutritious options. This lack of information and ignorance is also due to a lack of nutritional education, which is likely to prevent community

members from understanding the specific nutritional needs of their children and making informed food choices, as well as ignorance of the different types of food, which limits children's normal growth. Interventions to improve access to food strengthen nutrition education and increase awareness of favourable eating practices would be essential to promote better nutrition in children under 5. CACs play a crucial role in improving access to food within communities, by supporting the construction and improvement of gardens and fish ponds. This increases local production of nutritious food and improves the availability of food for households. Community members testify from different perspectives that the CACs are also involved in food distribution, ensuring that community members have access to healthy food although there are still operational and financial challenges. In terms of health awareness, statements from community members indicate that CACs support community members in accessing health facilities, facilitating the use of available health services and encouraging disease prevention. It is therefore important to strengthen support for the CACs by providing them with the resources and support they need to carry out their activities, particularly in terms of training, infrastructure and logistics. Community involvement : The involvement of community members in CAC activities fosters a sense of ownership and reinforces the positive impact on health and well-being. Statements from community members confirm that CACs play an essential role in promoting the health and well-being of communities by improving access to nutrition, healthcare and information. Their commitment to awareness- raising and community mobilization amplifies their positive impact.

However, in order to sustain these achievements, it is necessary to strengthen support for the CACs, i.e. to provide the CACs with the resources and training they need to continue and extend their health promotion activities to all sections of the population, and to put in place mechanisms for intersectoral collaboration between the health authorities, No-governmental organizations and other key actors for a holistic approach to promoting the nutritional status of children under the age of 5. The CACs play a crucial role in mobilizing communities to monitor agricultural production and promote community participation in agricultural development. CAC members are also actively involved in monitoring agricultural production in their communities. The CACs encourage the active participation of community members in agricultural activities by organizing training, workshops and awareness-raising campaigns. The extracts highlight the essential role of CACs as a link between farmers and agricultural development stakeholders. By facilitating production monitoring, encouraging community participation and fostering collaboration, CACs help to strengthen the resilience of farming communities and improve their livelihoods. Les citations ci-dessous illustrent ces résultats:

"The staple food is fou, from 6 to 12 months it's foufou and that's twice, however, the frequency is 2 times for the majority and it depends on the possibility of having the means". Declaration by a control zone participant.
" at 6 months, we give him breast milk, which helps to protect him and keep his body safe, even at 7 months. In my
*"The CAC had helped me in many things because it had shown me how I can prepare good food for my children so that they are healthy and to this day, my children are healthy thanks to the support of the CAC (control zone "***.**
"As a member of CAC, we participate in the monitoring of agricultural products, and the community also participates in CAC activities" About a participant in the control zone.

Table 4.3: Household knowledge of the functional effectiveness of CACs in improving the nutritional status of children under 5 years of age

Variable			Baseline control zone	Baseline intervention zone	Total	OR(95% IC)	P value
Number of meals a child aged between 6 and 24 months should eat per day							
Good functional capacity	Good nutritional status	*1 meal/ day*	05 (13.51)	03 (13.64)	8	1,7(0,4-7,4)	0,512
		2 meals/ day	24 (64.86)	16 (72.73)	40		
		At least 3 meals a day/Other	08 (21.62)	03 (9.09)	11		
Poor functional capacity	Poor nutritional status	*1 meal/ day*	10 (9.71)	26 (22.03)	36	1,1(0,6-2,0)	0,660
		2 meals/ day	60 (58.25)	58 (49.15)	118		
		At least 3 meals a day/Other	33(32.04)	34 (28.82)	67		
Breastfeeding children aged 20 to 24 months							
Good functional capacity	Good nutritional status	Always	03 (8.11)	08 (36.36)	11	0,1(0,0-0,6)	0,013
		Often	05 (13.51)	01 (4.55)	6		
		Very often	11 (29.73)	04 (18.8)	15		
		Not at all	18 (48.65)	09 (40.91)	27		
Poor functional capacity	Poor nutritional status	Always	19 (18.45)	37 (31.36)	56	0,4(0,2-0,9)	0,030
		Often	17 (16.50)	18 (15.25)	35		
		Very often	27 (26.21)	12 (10.17)	39		
		Not at all	40 (38.83)	51 (43.22)	91		
Food given to children aged 0 to 6 months							
Good functional capacity	Good nutritional status	Breast milk only	11 (29.73)	11 (50.0)	22	2,3(0,7-7,0)	0,165
		Breast milk with other Food	26 (70.27)	11 (50.0)	37		
Poor functional capacity	Poor nutritional status	Breast milk only	60 (58.25)	88 (74.58)	148	2,1(1,1-3,7)	0,014
		Breast milk with other Food	43 (41.75)	30 (25.42)	73		
Number of meals the child must eat per day in this household							
Good functional capacity	Good nutritional status	At least 2 meals a day	20 (54.05)	10 (45.45)	30	0,4(0,1-1,1)	0,109
		2 to 3 meals per day	12 (32.43)	12 (54.55)	24		
		More than 3 meals per	05 (13.51)	0 (0.0)	5		

		Day					
		As required	0 (0.0)	0 (0.0)	0		
		3 meals a day with rusty Causes	0 (0.0)	0 (0.0)	0		
Poor functional capacity	Poor nutritional status	At least 2 meals a day	35 (33.98)	35 (29.66)	70	2,2(1,2-3,8)	0,004
		2 to 3 meals per day	34 (33.01)	62 (52.54)	96		
		More than 3 meals per Day	27 (26.21)	19 (16.10)	46		
		As required	06 (5.83)	01 (0.85)	7		
		3 meals a day with rusty Causes	01 (0.97)	01 (0.85)	2		

Table 4.4 **Household knowledge of the functional effectiveness of CACs in improving the nutritional status of children under 5 years of age.**

Variable			Baseline contrôle zone	Baseline intervention zone	Total	OR(95% IC)	P value
The age recommended for the introduction of semi-solid foods:							
Good functional capacity	Good nutritional status	2 months	04 (10.8)	0 (0.0)	4	0,00(ND*)	0,266
		Around 6 months	33(89.2)	22 (100)	55		
Poor functional capacity	Poor nutritional status	2 months	26 (25.24)	04 (10.81)	30	0,3(0,1-1,1)	0,1
		Around 6 months	77 (74.76)	33 (89.19)	110		
Connaissance des ménages d'une alimentation équilibrée							
Good functional capacity	Good nutritional status	Variety of foods from all the food groups	13 (35.14)	10 (45.45)	23	0,6(0,2-1,9)	0,581
		Foods from a single food Group	05 (13.51)	01 (4.55)	6		
		Foods rich in sugar and fat.	04 (10.81)	02 (9.09)	6		
		All types of diet	12 (32.43)	04 (18.18)	16		
		Other	03 (8.11)	05 (22.73)			
Poor functional capacity	Poor nutritional status	Variety of foods from all the food groups	62 (60.19)	65 (55.08)	127		
		Foods from a single food Group	03 (2.91)	10 (8.47)	13	1,2(0,7-2,1)	0,496
		Foods rich in sugar and fat.	06 (5.83)	07 (5.93)	13		
		All types of diet	17 (16.50)	25 (21.19)	42		
		Other	15 (14.56)	11 (9.32)	26		

**ND : Not defined*

4.5. Knowledge on the training, *of Community Animation Cells teams* in nutrition for children under 5 in the Bunyakiri health zone.

It was found that in the control zone, 60% of CAC members said they had received training on the role of CAC members, compared with 53% of CAC members questioned in the intervention zone, but no significant difference was observed in the two zones [OR=0.76 (0.27-2.1),p=0.79]. In both zones, most of the training received beforehand was between 1 and 3 days, including all the planned subjects, with 50% and 50% respectively [OR=0.33 (0.03-3.5), p=0.60]. In the control zone, 43.3% of CAC members said they had received training on community strategies to combat malnutrition, compared with only 30% of members in the intervention zone who said they had. A difference between these two study areas was significantly observed [OR=3.2 (0.2-0.9), p=0. 004] The members of the CACs declared that both in the control zones (43.5%) and in the intervention zone (40%), it was technical and financial partners who had facilitated the previous capacity training, but there was no significant difference on the CACs activities in improving the nutritional status of children [OR=0.84 (0.2-1.4), p=0.44] (***Table 4.5***).

A qualitative analysis showed the crucial role played by training members of the CACs in strengthening their approaches to combating malnutrition in children under the age of 5. Training for CAC members: Training is organized much more by No-governmental organizations, by some health center and sometimes by the Ministry of Health, represented by the provincial health division (DPS). For the other CACs, some members are not yet trained by the organizations, which is why they have certain limitations. The Tshigoma CAC is a case in point. Findings in the field have shown that, as part of their role as community relays, CAC members have never received capacity- building training. However, some members have already received training from the Ministry of Health, but not on behalf of the CAC. It has been shown that training is irregular and favors certain CAC members. Training sessions attended by CAC members have occurred in the past. CAC members recognize the importance of training and want such sessions to be organized on a regular basis. One CAC member argues. Another CAC member admits to having taken part in a training course organized by the Doctors of Africa, but it was short-lived. In relation to the various statements raised above, there is a lack of ongoing training for members working in the various Community Animation Cells in the different localities (villages, groups). This lack of training for the members running the CACs has a negative impact on the quality of the work they do, while also having a negative impact on their knowledge of the prerequisites. Secondly, when members are not sufficiently trained, the advice and services they provide will also be limited. This multifaceted training crisis is a major challenge to be met by those responsible for training CAC members in their respective entities in order to strengthen their know-how. It should also be pointed out that the crisis and the lack of training for certain CAC members can lead to weaknesses in the normal functioning of the Community Animation Cells and, above all, in the achievement and attainment of its

objectives. For this reason, it is important to Organise and increase the number of training sessions in order to build the capacity of the members running the Community Animation Cells . This increase in the number of training sessions will only be possible with the collaboration and involvement of the various actors, the main responsibility for which lies with the government, followed by the health centre coordinators and the provincial health division (DPS). Apart from the training crisis among CAC members, there is a lack of supervision and coaching from members who have already been trained to newly recruited members.

it was shown that the majority of actors or healthcare providers have been trained in nutrition and other essential family practices, but this has lasted a long time, to the point where some subjects continue to elude them. For example, those linked to community organization. Similarly, the training received by members of the CACs from various partners does not suggest that they are and remain effective. However, in Bagana health area, the members are trained in community-based nutrition. The regular organization of training for members of the various Community Animation Cells can have a positive impact on the quality of advice that CAC members have to give to community members, especially those living in the community. It is important to analyses the purpose of the training for the members of the community development team.

"...Formation concerning the roles of CAC members, we have received two training courses, the first on how to combat malnutrition and the second on drinking water in the form of community relays, as we know that community relays are also CAC members. The first training course was run by TPO at control zone in 2021 health center.

"*..... Mr. Researcher, some of our members have never received training, but they perform some functions in our Community Animation Cells ". and*: " *We have never had any training on behalf of the CAC, but some of our members have already had the opportunity to take part in training courses organized by the Ministry of Health. But we, as the CAC, have never taken part in such sessions. "* A participant in the intervention zone.

."A member of the CACs added:» *for us, the members of the first Kando CAC, we have never received training on the roles and functions of the CAC member, apart from a few directives that the agents of the NGO MDA gave to the first committee that they set up for the first time"* Focus group interview, in the intervention zone.

"....As a CAC member, here at home in Kando we have only received training in the demonstration of the culinary arts, showing the types of food that parents should prepare to combat malnutrition in their children, and this has been the case since the creation of our CAC...". Focus in the intervention zone

"It was *the outgoing chairmen and members of the CAC who were trained, but all of us here have not been trained since the installation of this CAC apart from the briefing that the officer from the provincial division of social affairs gave us, no other person has trained us on our roles as members of the communities* ".

"We've never had training for all CAC members, but there have only been a few CAC members who have been chosen to take part in training" A participant in the intervention zone.

"The MDA came to talk to us about health, but also to give cooking demonstrations. I think that's what I thought of as training" A participant in the intervention zone.
" , a member is targeted for training at the health centre, but the members who are trained by the health center and partners do not pass on the information to the other members who have not been trained. ". In addition to the CACs, the other informants (heads of health facilities, the central office of the Bunyakiri health zone, donors, technical and financial partners and those implementing health programs and projects that take CACs into account; after interviews in various focus groups,

"We have been trained by Pronanut since 2016 on community-based nutrition with access to the importance of CACs but the other training courses cover other topics such as PCIMA, ANJE, etc." Bunyakiri health facility manager.

"The members of the CACs are trained, even if they may forget certain concepts over time. ". Bagana health facility managers.

"being responsible for the structures, we participated in the various training sessions organized for the CACs with the support of the partner organizations and with technical support from Pronanut.

For Purpose of the course ; the training organized by the partners for the members of the Community Animation Cells aims to assimilate a number of functions for its members. Individuals are trained to raise awareness among women and parents of the socio-health risks that can have a negative impact on children's health and lead to malnutrition. The following statement illustrates the functions of the member. The second function for which CAC members are trained is to assess the state of health of children from different households and refer those showing signs and symptoms of malnutrition to the nearest health center. From the experiences of the CACs members, it can be deduced that the training received by the members of the CACs aims to equip them with the skills and knowledge they need to play an effective role in promoting health and well- being within their communities.

"The training I attended was to find out who the community relay was and its role in the community, with an emphasis on community screening and how to maintain a balanced diet for members of the community" A participant in the intervention zone.

Table 4.5. Knowledge on the training of Community Animation Cells workers in nutrition for children under 5 years.

Control		Intervention		
Variable	Baseline	Baseline	OR (95% IC	Sig.
	n=30(%)	**n=30(%)**		
Have received training (CAC member role)				
Non	12(40.0)	14(46.7)	0.76 (0.27-2.1)	
Yes	18(60.0)	16(53.3)		0.79
Course duration				
1-3 days	15(50.0)	15(50.0)	0.33 (0.03-3.5)	
4-7 days	3(10.0)	1(3.3)		0.60
Type of training Received				

Training on the signs of malnutrition	1(3.3)	0(0.0)		
Community Strategies	13(43.3)	9(30.0)	3.2 (0.2-0.9)	0.004
Types of food, breast-feeding children	4(13.3)	5(16.7)		
Food production, essential family Practices	0(0.0)	2(6.7)		
Trainer/support (who provided the training)				
Partners	13(43.3)	12(40.0)	0.84 (0.2-1.4)	
MOH	5(16.7)	3(10.0)		
No training Received	12(40.0)	15(50.0)		0.44
Adapting training to work as a CAC Member				
No	13(43.3)	19(63.3)	0.9 (0.2-2.9)	1

4.6 Knowledge on tools and work aids used by members of Community Animation Cells teams on nutrition in children under 5 months.

Tools such as: (i) Advice card (good nutritional practice) (ii) Key messages booklet (iii) Minister's counting booklet were the least used and almost non-existent in the control and intervention zones. It was also observed and according to the declarations of at least 10µ of the members of the CACs in the control zone than in the intervention zone that it was difficult to report monthly [OR=1.7 (1.2-5.6), p=0.41). The visible signs of malnutrition in children under 5 years of age were little known by the members of the CACs questioned, i.e. less than 50µ in both zones (control and intervention) knew: (1) Not growing or gaining weight at the expected rate (slow growth) (2) Changes in behaviour, such as unusual irritability, slowness or anxiety. (3) Oedema, (4) Low energy levels and fatigue more easily than other children cm as a visible sign of malnutrition in children. (***Table 4.6***).

As part of the results of qualitative analysis, knowledge of the signs of malnutrition in children, Observation of the clinical signs of malnutrition by community members is one of the methods used to assess children's nutritional status. The signs cited by community members include thinness, fatigue and changes in the child's skin and hair, as well as swelling of the legs, another member explained malnutrition in terms of socio-economic conditions. For community members, these signs indicate that the child is not getting enough nutrients or has problems absorbing nutrients. To this end, community members point out that obtaining information from parents about the child's diet, eating habits and medical history, including the mother's state of health, can help to understand the clinical signs of child nutrition problems and identify appropriate interventions. During interviews with CAC members, he found that community relays and CAC members must send their reports to the CAC level after a summary has been made and this report will then be sent to the health centre to take action in relation to the issues raised (in terms of problems), hence the supervision takes on its meaning to be a routine programmed at the level of the HC. There are no reporting forms for the members of the CACs. The following statements by community members illustrate this situation*:*

"It's from the change in the child's body, also from the knowledge of the child's weight. There is weighing and measuring the child's height" to which is added another relevant statement*: "When we see the child's legs changing, the child's health gradually deteriorates". A participant in the control zone.*
"*It's the lack of food or the lack of a good place to sleep. I can say that it's an illness that comes from a lack of basic necessities".* A participant in the intervention zone.
"The child refuses to eat the food, he chooses what he must eat and what he cannot eat" (*A participant in the intervention zone*
"If the mother's health is poor, this can also affect the child. This can also be seen when the child refuses to eat" A participant in the intervention zone.
"I only draw up a schedule of visits as part of the monitoring of nutrition activities, and we share the concerns and possible solutions of certain CACs, but it is difficult to cover all the CACs in a month for several reasons, in particular the activities at the health area and the resources available", said one of the managers of the Tshigoma health area (intervention zone).

Table 4.6. Knowledge on tools and work aids used by members of Community Animation Cells teams on nutrition in children under 5 months.

	Control	Intervention		
Variable	Baseline	Baseline	OR (95%IC)	Sig.
A tool to assist CACs in their work	n=30(%)	n=30(%)		
Type of tools and help provided to get the job done			0,72(0,1-3,5)	0,999
Minister's counting book	11(36.7)	15(50.0)		
Minister's counting booklet Advice card (good nutritional practice) (iii). Leaflets	1(3.3)	5(16.7)		
(i) Minister's counting book (ii). Image box	2(6.7)	1(3.3)		
(i) Advice card (good nutritional practice) (ii) Key messages booklet (iii) Minister's counting booklet	3(10.0)	4(13.3)		
(i) Prevention framework (ii) Image box (iii). Leaflets	2(6.7)	0(0.0)		
Other generic tools	1(3.3)	5(16.7)		
Frequency of maintenance or Restocking				
Annual	3(10.0)	10(33.3)	1.7 (1.2-5.6)	0.41
Monthly	3(10.0)	3(10.0)		
Don't know anything	19(63.3)	15(50.0)		
Half-yearly	0(0.0)	1(3.3)		
Quarterly	5(16.7)	1(3.3)		
Knowledge of the visible signs of child malnutrition				
(1) Low energy levels and fatigue more easily than other children (2) Changes in behaviour, such as unusual irritability, slowness or anxiety.	2(6.7)	2(6.7)	1,0(0,3-2,7)	0,999
(1) Not growing or gaining weight at the expected rate (slow growth) (2) Changes in behaviour, such as unusual irritability, slowness or anxiety. (3) Oedema, (4) Low energy levels and fatigue more easily than other children	14(46.7)	14(46.7)		
Oedema	1(3.3)	1(3.3)		
(1) Oedema (2) Low energy levels and fatigue more easily than other children 2. Behavioural changes, such as unusual irritability, slowness or anxiety.	10(33.3)	9(30.0)		

(1)PB less than 125 mm (2) Oedema (3) Not growing or gaining weight at the expected rate (slowed growth)	2(6.7)	4(13.3)		
Other (please specify)	1(3.3)	0(0.0)		

4.7.. Knowledge of Community Animation Cells workers on the nutrition of children under 5 year,

In the control zone, 70% of CAC members knew that a child should be breastfed at least 8 times a day, compared with 43.3% of CAC members in the intervention zone, [OR=3.0 (1.0-8.8), p=0.06]; in the control zone, at least 76.7% of CAC members knew that a variety of foods from all food groups should be provided in appropriate proportions, whereas in the intervention zone this proportion was 73.3% of CAC members, [OR=1. 81 (0.8-11), p=0.002]; the effectiveness of functional capacities of the CACs was linked with CAC members' knowledge , the number of times, i.e. more than 3 times a day, that a child should eat, [OR=3.1 (2.4-21), p=0.005]. (***Table 4.7.)***

Table 4.7. Knowledge of Community Animation Cells workers on the nutrition of children under 5 year.

	Control	Intervention		
Variable	Baseline	Baseline	OR (95%IC)	Sig.
Knowledge of nutrition	n=30(%)	n=30(%)		
Continue breastfeeding even after the introduction of solid foods/complements.				
Yes, breastfeeding should continue alongside solid food until at least 2 years of age.	27(90.0)	30(100.0)	0.31 (0.0-3.1)	
Only if the baby refuses solid food	1(3.3)	0(0.0)		
Only if the mother wants to continue	2(6.7)	0(0.0)		0.61
Knowledge of a balanced diet				
A variety of foods from all the food groups in appropriate proportions.	23(76.7)	22(73.3)	1.81 (0.8-11)	
Foods from a single food group.	2(6.7)	3(10.0)		
Foods rich in sugar and fat	0(0.0)	0(0.0)		
All types of food are considered balanced	5(16.7)	5(16.7)		0.002
Number of times a day a child should eat				
Less than two meals	3(10.0)	1(3.3)	3.1 (2.4-21)	
Two to three main meals.	10(33.3)	19(63.3)		
More than three times a day.	10(33.3)	10(33.3)		
According to the child's needs and appetite.	3(10.0)	0(0.0)		
Three main meals and snacks between meals	4(13.3)	0(0.0)		0.005

4.8. Knowledge of the roles and scope of application of the members of the Community Animation Cells with regard to nutrition in children under 5 years of age.

.

In the control area, at least 20% of CAC members were aware of the roles of CAC members such as: (1) Forwarding information to CODEV and CODESA (2). Organizing regular meetings to monitor and evaluate the community action plan. (3) Ensuring the mobilization of local resources for the implementation of the local development plan (e.g. maintenance of water points) (4) Drawing up and implementing local emergency response plans given that in the intervention zone this proportion was only 13.3%. (***Table 4.8.***).

The qualitative analysis also found that the role of the Community Animation Cells (CAC) in the fight against malnutrition. : Recognition of Community Animation Units and their activities : Community members highlight the growing recognition of CACs within communities, emphasizing their role in local development and improving health by creating a climate of trust between patients and doctors, a relevant statement reinforces the roles of the CACs. The activities carried out by CAC members to raise awareness in the community constitute a framework of recognition for some community members, although the geographical sphere of awareness-raising is small, as community members state. However, there are still gaps in communication and a clear understanding of the responsibilities of the CACs. However, community members have heard of CACs and recognize their involvement in dispensaries and raising awareness of community ownership and another community member added to the lack of recognition of the CACs. To this end, community members express a need for clearer information on the roles and responsibilities of CACs, as well as on the tangible results of their actions. In these analyses, we feel that CAC members have limitations in promoting activities to community members and are not active in the field to put their actions into practice. As the CAC is a community relay team, it works with community members so that together they can find solutions to social, health and economic problems. We can thus say that the CAC is organized and makes sacrifices to help the members of the community, despite the challenges they face. It would be better to make the necessary resources available so that CAC members can better carry out their activities

"CAC helps us with development and agriculture". Statement from a participant in the control zone. *"They enable us to connect with patients and doctors".* (Bagana).

"They also have the role of seeking information related to health care in order to improve health, they are involved in development activities" Tshigoma.

"The CAC goes into houses to raise awareness and train people, but I don't know if it's this cell I'm talking about that you're referring to". Statement from a participant in the intervention zone.

*"Yes, we know about CACs, they have the role of doing the properties in the dispensaries and in the neighborhoods, CAC members also raise awareness among community members about cleanliness and health".*Bagana.

"I've never understood the name. It's your arrival that lets me know it exists in our community". Statement from a participant in the intervention zone.

"I never understood the name. It's your arrival that lets me know it exists in our community. For Bunyakiri and "The CAC goes into houses to raise awareness and train people, but I don't know if it's the cell I'm talking about that you were referring to. Statement from a participant in the intervention zone.
"we're leaving here to go to the EBAMBA health centre where we can learn how we can better play our role as community relays (Bunyakiri). Another participant explains:
"The CAC works well in our community because it trains us and gives us lots of opportunities to be more useful in the community. We work closely with community members so that together we can find solutions" Statement from a participant in the intervention zone.

Operation of Community Animation Cells *:* The community members gave an overview of how the Community Action Groups work to promote local development and collaboration with the communities. From the various opinions of community members, we note that the CACs collaborate with health centers to improve access to healthcare and raise awareness of public health issues, participate in agricultural capacity-building initiatives to improve household productivity and food security, and guide and advise community members on various issues related to local development and improving their living conditions. However, as part of their operations, the members of the CACs organize meetings and general assemblies, although not on a regular basis. It works with community members to find solutions to social, health and economic problems. In this way, the unit works with members who know their environment better and who have the ability to overcome the difficulties that community members may face. It is also important to point out that the results show that, in addition to CAC's intervention in the health and economic sectors, it is also recognised by community members in the livestock and agriculture sectors. Involvement of community members in the activities of the Community Animation Unit. By way of illustration:

"They go to the health center, to agricultural activities and to strengthen the capacity of households in agriculture, CAC works properly and they guide us in the way we can work. They hold general assemblies and meetings". Bagana.
"Here at home, the CAC works as follows: we leave here to go to the EBAMBA health center, where we learn how to farm and how we can better play our role as community relays" Statement from a participant in the intervention zone.

"The CAC works well in our community because it trains us and gives us lots of opportunities to be more useful in the community. We work closely with community members so that together we can find solutions". Statement from a participant in the intervention zone.

"CAC works very well because it goes out every day to talk to members of the community about the need to feed their children well and about livestock farming, but recently it has not been working very well because the financial aid it used to give us is no longer available" . Statement from a participant in the intervention zone.

Participation in weekly activities and distribution of vaccines *:* Community members attend CAC activities in the community on a weekly basis and when there is a need to distribute some vaccines to ensure the good health of community members. However, community members are aware of the crucial role played by CACs in community mobilization to promote health, development and well-being within the various communities. Community members actively participate in vaccination activities organised by the CACs, particularly on Sundays, the community's gathering day. The CACs also serve as a platform for community members to discuss the problems and challenges they face, and to identify collective solutions to improve their situation. It should be noted that membership of the CACs is open to all members of the community who wish to bring about positive change and serve their community, even in the face of resource constraints. The extracts also highlight the multi-dimensional role of CACs in promoting health and community development. CACs facilitate access to essential health services, such as immunization, while creating a space for dialogue and community action for collective problem-solving and improving the general well-being of the community.

A member speaks out: *"We take part in CAC activities on Sundays when the vaccine is available, but it's mainly on Sundays that we meet to discuss issues that concern our community.* Statement from a participant in the intervention zone.

The importance of strong community involvement for the success of CACs*. :* Some members of the community are actively involved in the initiatives run by the Community Action Centres (CACs), although there is a need to increase participation and inclusion, given that some members of the community are not overly active. However, it should be noted that community members are involved in monitoring agricultural produce, which indicates an interest in the food security initiatives led by the CACs. In collaboration with the CAC members, some community members are involved in building fish ponds and growing vegetables, demonstrating a concrete commitment to the fight against malnutrition. it is clear that some members of the community have not yet taken part in CAC activities, expressing a lack of knowledge or interest

"We have built fishponds, we have put fish in them to combat malnutrition and we have also grown vegetables". Statement from a participant in the control zone. A significant number of focus group participants who are members of the community already have individual gardens, indicating a desire to improve their diet and that of their children, despite their lack of direct participation in CAC activities. A statement made by a community member supports this. Participants' statements illustrate a community commitment to CACs, with examples of both

active participation and persistent apathy. Further awareness raising and mobilization efforts would be required to broaden participation and maximize the impact of community-led initiatives by identifying barriers to participation, developing targeted awareness strategies and inclusive activities.

"I have nothing to say because I have never taken part in CAC activities" Tshigoma/intervention

"We have small gardens at home that we cultivate in order to find food to eat and give to our children, thanks to the various awareness-raising activities carried out by CAC members" Statement from a participant in the control zone.

Table 4.8. Knowledge of the roles and scope of application of the members of the Community Animation Cells with regard to nutrition in children under 5 years of age. .

	Control	Intervention		
Variable	Baseline	Baseline		
Roles as a member of the CAC	***n=30(%)***	***n=30(%)***	***OR(IC à 95%)***	***p-value***
Other (please specify)	7(23.3)	8(26.7)		
Organisation of meetings to analyse the information Collected.	1(3.3)	0(0.0)		
(1) Centralisation of data collected in the community (2) Transmission of information to CODEV and CODESA (3) Development and implementation of the community action plan and maintenance of village facilities with the participation of all key actors in the village (4) Scheduling of consultation meetings with the village/cell population	2(6.7)	5(16.7)		
(1) Scheduling consultation meetings with the village/cell population (2) Ensuring the security of the materials and equipment assigned to the villages/cells (3) Transmitting information to CODEV and CODESA (4) Centralising the data collected in the community (5) Organising meetings to analyse the information collected. (6) Feedback to the village at the general assembly 5. Develop and implement the community action plan and maintain the village facilities with the participation of all the key actors in the village. (7) Organise regular meetings to monitor and evaluate the community action plan. (8) Ensure the mobilisation of local resources to implement the local development plan (e.g. maintenance of water points) (9) Develop and implement local emergency response plans.	2(6.7)	1(3.3)		
(1) Organisation of meetings to analyse the information collected (2) Transmission of information to CODEV and CODESA (3) Development and implementation of the community action plan and maintenance of village facilities with the participation of all key actors in the village (4) Development and implementation of local emergency response plans (5) Ensuring the security of materials and equipment assigned to villages/cells (6) Scheduling of consultation meetings with the village/cell population.	5(16.7)	1(3.3)		
(1) Transmission of information to CODEV and Codesa (2). Organise regular meetings to monitor and evaluate the community action plan. (3) Ensure the mobilization of local resources to implement the local development plan (e.g. maintenance of water points) (4) Draw up and implement local emergency response plans.	6(20.0)	4(13.3)		
(1) Ensure the mobilization of local resources for the implementation of the local development plan (e.g. maintenance of water points) (2) Organise regular meetings to monitor and evaluate the community action plan (3) Develop and implement the community action plan and maintain village facilities with the participation of all key actors in the village.	2(6.7)	1(3.3)		
(1) Draw up and implement local emergency response plans (2) Draw up and implement the community action plan and maintain village facilities with the participation of all key actors in the village (3) Ensure the mobilization of local resources to implement the local development plan (e.g. maintenance of water points)	4(13.3)	8(26.7)	1,6(0,4-6,4)	0,730
(1) Ensure the security of the materials and equipment assigned to the villages/cells (2)	1(3.3)	2(6.7)		

Ensure the mobilization of local resources for the implementation of the local development plan (e.g. maintenance of water points) (3) Feedback to the village at the general meeting (4) Transmission of information to CODEV and CODESA				

4.9.. Knowledge of technical assistance and motivation of the members of the Community Animation Cells on nutrition in children under 5 years.

Table 4.9 shows that the level of technical support was better in the control zone than in the intervention zone through: (1) payment of the operating costs of partners in the health zone, (2) provision of vegetable seeds, (3) provision of work equipment (boots, briefcases, mackintosh, etc.). This support for the work of the CACs is visible to 3.3% of CAC members in the control zone and 3.3% in the intervention zone, [OR=2.25(0,8-6,3), p=0.196]. In the control zone, support in the form of : Provision of income-generating activities according to 23.3% of CAC members surveyed, while in the intervention zone 3.3% of CAC members said they had this type of support in order to make their CAC effective in the fight against child malnutrition. Support in the form of equipment, seeds and tools came from technical and financial partners in the control and intervention zones (46.7% and 43.3% respectively), but no significant difference was also observed, [OR=0.87(0.31-2.4), p=0.999].

Table 4.9. Knowledge of technical assistance and motivation of the members of the Community Animation Cells on nutrition in children under 5 years.

	Control	**Intervention**		
Variable	Baseline	Baseline		
Technical assistance, motivation	*n=30(%)*	*n=30(%)*	*OR(95% IC)*	*p-value*
Support for CAC's work.				
Supporting the operating costs of partners in the health zone, Supplying vegetable seeds, Providing work equipment	1(3.3)	1(3.3)	2,25(0,8-6,3)	0,196
Financial incentives for routine activities	2(6.7)	4(13.3)		
(1) Provision of certain working tools by the health zone central office (2) Provision of income-generating activities	2(6.7)	0(0.0)		
(1) Provision of income-generating activities (2) Provision of market garden seeds (3) Provision of work equipment	4(13.3)	10(33.3)		
Management tools at community level (registers, prevention plans,)	3(10.0)	3(10.0)		
Other (please specify)	18(60.0)	12(40.0)		

Type of support received by the CAC				
Operating costs	4(13.3)	10(33.3)	0 ?2(0,1-3,5)	0,999
(1) Operating costs (2) Provision of income-generating activities(3) Provision of market garden seeds	0(0.0)	2(6.7)		
Provision of income-generating activities	7(23.3)	1(3.3)		
Supply of vegetable seeds	15(50.0)	14(46.7)		
(1) Supply of market garden seeds (2) By supporting the operating costs of partners in the health zone	1(3.3)	1(3.3)		
(1) By supporting the operating costs of partners in the health zone (2) Supply of market garden seeds	3(10.0)	2(6.7)		
Support structure or body received for the CAC				
MOH,	5(16.7)	4(13.3)	0,87(0,31-2,4)	0,999
Partners	14(46.7)	13(43.3)		
FBO	1(3.3)	0(0.0)		
Other	11(36.7)	12(40.0)		

4.10:. Cultural and traditional attitudes and perceptions of households on nutritional practices in relation to the functional effectiveness of CACs

It emerged that in the areas where the functional capacities of the CACs were judged to be weak, in the control zone (90.29%) and in the intervention zone (88.98%), nutritional practices in the households of children under the age of 5 linked to cultural considerations had no influence on the functional capacities of the CACs in their activities to improve the nutritional status of these children under the age of 5. [OR=1.15(0.4-2.7), p=0827]; and the assessment of the usefulness of the members of the CACs in the fight against malnutrition by households was not linked to their functional effectiveness in either the control zone or the intervention zone [OR=0.57(0.1-1.7), p=0.405]. We also note that no significant differences were observed among the variables studied, p>0.05. (**Table 4.10:**)

Table 4.10: Cultural and traditional attitudes and perceptions of households on nutritional practices in relation to the functional effectiveness of CACs in Bunyakiri Health Zone.

Variable			Baseline control zone	Baseline Intervention zone	Total	OR(95% IC)	P value
Cultural/traditional beliefs about eating practices							
Good functional capacity	Good nutritional status	No	34 (91.89)	22 (100)	56	0,00(ND)	0,286
		Yes	03 (8.11)	0 (0.0)	3		

Poor functional capacity	Poor nutritional status	No	93 (90.29)	105 (88.98)	198	1,15(0,4-2,7)	0,827
		Yes	10 (9.71)	13 (11.02)	23		
The usefulness of CAC members in the fight against malnutrition							
Poor functional capacity	Good nutritional status	*No*	25 (67.57)	12 (54.55)	37	0,57(0,1-1,7)	0,405
		Yes	12 (32.43)	10 (45.45)	22		
Poor functional capacity	Poor nutritional status	*No*	53 (51.46)	54 (45.76)	107	0,79(0,4-1,3)	0,42
		Yes	50 (48.54)	64 (54.24)	114		

4.1.10. Perception/attitude on the functional capacities of the members of the Community Animation Cells in terms of nutrition in children under 5 years

In the control zone, 73.3% of the members of the CACs had positive attitudes/perceptions regarding their participation and the role they play in child nutrition at village level, while this same perception and positive attitude and the positive perception by the other partners was 90% of the CACs in the intervention zone considering that they play a good role in the fight against malnutrition in children under 5 years of age [OR=0. 30(0.0-1.2), p=0.10]. (**Table 4.1.10**).

Table 4.1.10. Perception/attitude on the functional capacities of the members of the Community Animation Cells in terms of nutrition in children under 5 years

Variable	Baseline Control	Baseline intervention		
Attitude/perception	**n=30(%)**	**n=30(%)**	OR (95%IC)	Sig
Perception of the participation and role of CAC members in improving nutrition and appreciation by other partners.				
Yes	22(73,3)	27(90,0)		
No	08(26,7)	3(10,0)	0.30(0.0-1.2)	0.10

4.11. Household notional practices in relation to the effectiveness of CACs in improving the notional status of 5-year-old children.

The results reveal that the fact that households give children appropriate (balanced) portions at mealtimes [OR=16.81(1.3-33.5), p=0.015]; the possession of gardens by households with children under 5 in the village [0R=0.29(0.1-0.5), p<0.001] were linked to the work of CACs in the communities, justifying their functional effectiveness in the villages. (**Table 4.11**).

Table 4.11. Household nutritional practices in relation to the effectiveness of CACs in improving the nutritional status of 5-year-old children in the Bunyakiri health zone.

Variable			Baseline control zone	Baseline intervention zone	Total	OR(95% IC)	P value
Distribution of appropriate portions at mealtimes							
Good functional capacity	Good nutritional status	I'm not sure about the portion size	17 (45.95)	07 (31.82)	24	16,81(1,3-33,5)	0,015
		Yes, I serve age appropriate portions	15 (40.54)	02 (9.09)	17		
		No, I provide my child with adult-sized portions.	05 (13.51)	13 (59.09)	18		
Poor functional capacity	Poor nutritional status	I'm not sure about the portion size	33 (32.04)	34 (28.81)	67	1,92(0,9-3,8)	0,072
		Yes, I serve age appropriate portions	57 (55.34)	13 (11.02)	70		
		No, I provide my child with adult-sized portions.	13 (12.62)	71 (60.17)	84		
Vegetable garden							
Good functional capacity	Good nutritional status	No	31 (83.78)	18 (81.82)	49	0,58(0,1-2,6)	0,697
		Yes	06 (16.22)	04 (18.18)	10		
Poor functional capacity	Poor nutritional status	No	81 (78.64)	61 (51.69)	142	0,29(0,1-0,5)	<0,001
		Yes	22 (21.36)	57 (48.31)	79		
Role and responsibilities of CAC members							
Good functional capacity	Good nutritional status	No	33 (89.19)	18 (81.82)	51	0,54(0,1-2,4)	0,455
		Yes	04 (10.81)	04 (18.18)	8		
Poor functional capacity	Poor nutritional status	No	75 (72.82)	73 (61.86)	148	0,60(0,3-1,0)	0,087
		Yes	28 (27.18)	45 (38.14)	73		
Visits from CAC members							
Good functional capacity	Good nutritional status	No	30 (81.08)	15 (68.18)	45	0,50(0,1-1,6)	0,345
		Yes	07 (18.92)	07 (31.82)	14		
Poor functional capacity	Poor nutritional status	No	64 (62.14)	75 (63.56)	139	1,05(0,6-1,8)	0,889
		Yes	39 (37.86)	43 (36.44)	82		

4.12. Practices on the functional capacities of members of Community Animation Cells teams in nutrition for children under 5 years. .

In the control area, 13.3% of CAC members stated that they had assumed their role as CAC at community level, in particular: (i) Implementing and monitoring decisions taken (ii). Participate in the planning of nutrition and health actions in the village/neighbourhood (iii). Mobilize local resources (iv). Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children). In the intervention zone, only 3.3% of CACs said this, but [OR=4,46(0,4-42,5), p0,353]. In the control zone, before the study, 6.7% of CAC members were motivated by the work of the CAC to improve children's health and in the intervention zone, this proportion was 16.7% of CAC members [OR=6.5 (2.0-20.7), p0.001]. The use of work tools, in particular: (1) household register (2) logbook/enumeration book (3) screening register, increased from 3.3% before the study in the control zone,. In the intervention zone, These tools were used by 16.7% of the CAC members interviewed during the survey (***Table 4.12***).

Based on the qualitative data, we can see that roles of CAC members **:** The results of the focus group interviews show that the members of the Community Animation Cells play several roles in their respective communities. CAC members play an important role in maintaining good relations between members of the community. As one CAC member put it. As a result, a CAC member has a major role to play in protecting the environment;. On the question of the usefulness of CAC and the ideal, CAC members recognised the relevance of collaboration between health zones and community members. One CAC member illustrates:

The recognition of roles by the members of the various coordination units is a variable explaining the motivation of the members in carrying out their tasks within their community. As a result, the members of the CAC are massively and actively involved in health promotion activities within their community, in order to contribute in some small way to the protection of maternal and child health in the various villages. However, other members often confuse the task of a community liaison officer with that of the CAC. For some, there is no clear distinction between a CAC agent and a community relay, especially as they both work for the development of the community. For the community relay, his work is to provide support to the community on a global level, whereas the community relay is much more oriented towards the health promotion sector, in order to carry out initial epidemiological surveillance, screening and referral of the case to the nearest health facility**.**

As a result, the Community Animation Cells raise community members' awareness of the causes and consequences of malnutrition. They provide information on a balanced diet, good breastfeeding practices, food diversification for infants and young children, and the importance of preventive health care. Their (CACs') role in awareness-raising, education, promoting

healthy eating practices, access to health services, capacity building and community mobilization is essential to improving the nutrition and health of rural populations.

In the course of this study and during the analysis of the qualitative data, among the motivating factors of the members of the CACs and of all the people interviewed, it was shown that several factors come into play: - Quality training for the members of the CACs (which enables them to invest in the Reco)

These training sessions should cover a range of topics, based on contextual analyses that take into account the epidemiological profiles of the health zones and provinces, so that they can become the multi-skilled community relays we want them to be in the different villages, health areas and health zones. This will enable them to be aware of all the signs of malnutrition to be observed in households, especially with the trust that these Reco establish with the parents of children in a given community. All the Relais should be in a database of available information to be made available in the health area for purposes relating to the state of health of children and other specific groups. In this case, the necessary tools will have to be made available to enable them to carry out their activities with a focus on preventing malnutrition in their village. - Legal recognition of community relays at institutional level . This should also be the subject of advocacy in order to grant them specific Relais cards after their training as members of the CACs " in order to identify them to third parties. However, this means being selective when choosing these relays: - Motivation in terms of money (programmed payment of the community relay), which should be given at the end of each month.

" .. the role is to raise awareness among women, especially those with children between the ages of zero and five, so that they are informed about the danger of malnutrition among children. The CAC member also has the role of monitoring and checking the state of health of the children in order to refer those affected by malnutrition to the health facilities. Bugerera focus group"

"The role of the CAC in Bututa community in particular is to raise parents' awareness of how to observe children's bodies, and when a member of the CAC identifies signs of malnutrition in children, he or she must refer them to a health center for treatment, as well as giving advice to the children's parents",

"It's to clean up our environment when it's dirty, for example when the river is dirty we have to call in as CAC members to maintain it, when there are slopes we get together to put mud in to prevent accidents. Then, another role of CAC members is to create gardens in which to plant vegetables".

"*The role of the CAC is to awaken the population or, in other words, to make the members of the community aware so that they are responsible for a balanced diet to prevent malnutrition in our village. ".*Tshigoma focus group interview.

" *Sir, the role of the Community Animation Cells is to advise pregnant and breastfeeding women on the type and quality of food they can give their children to prevent malnutrition. It also assesses the state of health of our children and advises us on the measures to be taken to monitor the state of health of our children in our communities.* ".

"As we were taught, our role is to monitor the health of children under the age of 5 to guide

and raise awareness among community members so that they have an idea of how to combat measles and malnutrition in our community" for Bunyakiri.
"Firstly, our role is to monitor the development of children aged 0 to 5. Secondly, we are also interested in the fight against insalubrity, which can be the cause of many illnesses in our community" (Bunyakiri).
"Our role is to see how people live in the community and to see how people can create the village assembly to build strong relationships in the community. Mobilize the health zones to continue working with community members to combat the diseases that attack children" (Bunyakiri).
"We raise awareness and train women on how to breastfeed their children and we train them on how to feed their children so that they grow up healthy. We raise awareness in households" (Bunyakiri).
"The CAC works with the health zones and community members for the same objective and this makes it useful for the community as well as for the community members" (Bunyakiri).
"The CAC is useful for what it does by collecting statistics on birth rates in the community, mortality rates and malnutrition, but also other diseases, and this is useful for the country and for our community" (Bunyakiri).
"The first motivation that I can raise is training, because if the members of the CACs are well trained, it is already a way of valuing a person", said a manager at the intermediate level of the Ministry of Health.
"We need to invest in community relays in the fight against malnutrition, because these people are less demanding, even though they bring added value. If we give them $5 or $10 regularly, I can assure you that they will be highly motivated and will find ways to help their community," said a manager at the provincial health division.

Table 4.12. Practices on the functional capacities of members of Community Animation Cells teams in nutrition for children under 5 years.

	Control	**Intervention**		
Variable	Baseline	Baseline	OR (95%IC)	Sig.
Role(s) played by the CAC in the community	**n=30(%)**	**n=30(%)**		
Participate in planning nutrition and health actions in the village/neighbourhood	1(3.3)	3(10.0)	4,46(0,4-42,5)	0,353
B(i) Participate in the planning of nutrition and health actions in the village/neighbourhood (ii). Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children, etc.) (iii). Draft and submit reports to CODESA.	3(10.0)	10(33.3)		
(i) Implementing and monitoring decisions taken (ii). Participate in the planning of nutrition and health actions in the village/neighbourhood (iii). Mobilize local resources (iv). Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children).	4(13.3)	1(3.3)		
(i) Implementation and monitoring of decisions taken (ii). Mobilise local resources (iii). Draft and submit reports to CODESA.	1(3.3)	1(3.3)		
(i) Mobilise local resources (ii). Participate in the planning of nutrition and health activities in the village/neighbourhood (iii). Coordinate nutrition and development activities in the village: (iv) Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children).	4(13.3)	1(3.3)		
Draft and submit reports to CODESA.	4(13.3)	4(13.3)		
(i) Draft and submit reports to the CODESA. (ii) Coordinate nutrition and development actions in the village: (iii) Organise regular community meetings on the results of the community weighing and	4(13.3)	6(20.0)		

on practices to be promoted or solutions to problems identified by the CACs.				
Other (please specify)	9(30.0)	2(6.7)		
Motivation of CAC members, as volunteers, to carry out activities.				
No motivation	6(20.0)	3(10.0)	6.5 (2.0-20.7	0.001
Improving the health of children and women in my community	2(6.7)	5(16.7)		
The love of my own community	22(73.3)	19(63.3)		
Participate in activities at CODESA level	0(0.0)	3(10.0)		

Results related to Specific objective 2: To identify factors that promote the effective implementation of the functional capacities of the Community Animation Cells for the improvement of the nutritional status of children under five years in Bunyakiri health zone in South Kivu-DRC.

4.13. Socio-demographic profile of CAC members favouring their functional effectiveness in improving the nutritional status of children under 5 years of age

The majority of CAC members interviewed were men in both the control (73.3%) and intervention (60%) zones. CAC members who were men were 1.8 times more likely than women to be effective in community-level activities [OR=1.83 (0.61-5.45), p=0.41]. CAC members with a high level of education (secondary and university) were 1.22 times more likely to be effective in CAC activities to combat malnutrition than those with a primary level of education [OR1.22 (0.42-3.54), p=0.79]. CAC members who had at least one income-generating occupation or activity were 2.72 times more likely to be effective in their activities to combat child malnutrition in the village [2.72 (0.01-0.92)] and this occupation was a significant factor in CAC effectiveness in improving the nutritional status of children under 5 years of age (p=0.02<0.05).

Table 4.13. Socio-demographic profile of CAC members favouring their functional effectiveness in improving the nutritional status of children under 5 years of age

	Control	Intervention			
Variable	Baseline	Baseline	Total		
	n=30(%)	**n=30(%)**	**n=60(%)**	OR (95% IC	Sig.
Gender					
Male	22 (73,3)	18 (60)	40 (66,7)	1.83 (0.61-5.45)	0.41
Female	8 (26,7)	12(40)	20 (33,3)		
Marital Status					
Single	2 (6.7)	4 (13.3)	6 (10.0)	0.40 (0.06-2.43)	0.40
Married	27 (90.0)	22 (73.4)	49 (81.7)		
Widowed/Separated	1 (3.3)	3 (10.0)	4 (6.6)		
Separated	0 (0.0)	1(3.3)	1 (1.6)		
Level of education					
Primary	12 (40.0)	11 (36,7)	23 (38,3)	1.22 (0.42-3.54)	0.79

Secondary / High school	16 (53,3)	18 (60.0)	34 (56,7)		
Higher/university	2 (6,7)	1 (3.3)	3 (5.0)		
Occupation					
Self-employed (specify type of occupation)	24 (80.0)	25 (83.3)	49 (81.7)	2.72 (0.01-0.92)	0.02
Employed	1 (3.3)	2 (6.7)	3 (5.0)		
Agriculture	4 (13.4)	3 (10.0)	7 (11.6)		
First aid	1 (3.3)	0 (0.0)	1 (1.6)		
Ethinicity					
Mushi	1 (3.3)	1 (3.3)	2 (3.3)	1.0 (0.05-16.7)	1
Tembo	29 (96.7)	29 (96.7)	58 (96.7)		
Religion					
Christian	27 (90.0)	25 (83.3)	52 (86.6)	1.4 (0.29-7.0)	0.70
Muslim	0 (0.0)	1 (3.3)	1 (1.6)		
Other (please specify)	3 (10.0)	4 (13.4)	7 (11.6)		

4.14. Age range of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

In the control zone, CAC members over 30 years of age who had received training in community strategies for combating malnutrition were 1.31 times more likely to contribute to the effective implementation of the functional capacities of the Cellules d'Animation [OR=1.31(0.3-5.5), p=0.999] but in the intervention zone there was no relationship between the type of training received and the age of the CAC members responsible for community mobilization on nutrition [OR=0.02(0,1-3,0),p=0.087]. In the control zone, CAC members aged over 30 were 1.41 times more likely to know the composition of a balanced diet than those aged under 30 [OR=1.43(0.2-8.0), p=0.999], whereas in the intervention zone, CAC members were 2.14 times more likely to know a balanced diet [OR=2.14(0.4-11.1), p=0.417]; In both the control and intervention zones, no relationship was found between age and the fact that members of the CAC gave guidance to households on the number of times (2 to 3 times) that a child should eat per day, with respectively [OR=1.0(0.2-4.5), p=0.999] and][OR=0.51(0.1-2.5), p=0.466]; The same observation was made for the variables relating to the motivation of the CACs to work to improve the health of children and women in the community and the age of the members of the CACs, where no relationship was found between these variables, p=0.224 and 0.157. Throughout this analysis, no variable related to the age group of the respondents had a significant influence on the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5 years of age, p>0.05.

Table 4.14. Age range of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

	Control zone				intervention Zone				Control / intervention
	Age range				Age range				
Variables	>30 years old n=15	≤30 years old n=15	p-value (all)	p-value	>30 years old n=15	≤30 years old n=15	OR(95% IC	p-value	p-value (all)
Type of training									
No answer	5(41,7)	7(58,3)	1,31(0,3-5,5)	0,999	8(57,1)	6(42,5)	0,02(0,1-3,0)	0,087	0,178
Community strategies	7(53,8)	6(46,2)			5(55,6)	4(44,4)			
Training on the signs of malnutrition	0(0,0)	1(100)			6(85,7)	1(14,3)			
Types of food, breastfeeding children	3(75,0)	1(25,0)			0(0,0)	0(0,0)			
Knowledge of a balanced diet									
A variety of foods from all food groups in appropriate proportions.	11(47,8)	12(52,2)	1,43(0,2-8,0)	0,999	15(68,2)	7(31,8)	2,14(0,4-11,1)	0,417	0,215
Food from a single food group.	0(0,0)	2(100)			1(33,3)	2(66,7)			
Any type of diet is considered balanced	4(80,0)	1(0,0)			3(60)	2(40)			
Number of times a day a child should eat									
Less than two meals	1(33,3)	2(66,7)	1,0(0,2-4,5)	0,999	1(100)	0(0,0)	0,51(0,1-2,5)	0,466	0,97,3
Two to three main meals.	5(50)	5(50)			11(57,9)	8(42,1)			
More than three times a day.	4(40)	6(60)			7(70,0)	3(30)			
According to the child's need and appetite.	2(66,7)	1(33,3)			0(0,0)	0(0,0)			
Three main meals and snacks between meals	3(75)	1(25)			0(0,0)	0(0,0)			
motivates as a volunteer, to carry out CAC activities									
No motivation	3(50,0)	3(50,0)	ND*	0,224	2(66,7)	1(33,3)	0,00(0,5-61,8)	0,157	0,586
Improving the health of children and women in my community	0(0,0)	2(100)			4(80)	1(20)			
Love for my own community	12(54,5)	10(45,5)			13(61,9)	9(28,1)			

ND: Not Defined

4.15. Marital status of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

In the control zone, married CAC members trained in community strategies to combat malnutrition in children under 5 years of age were 2.9 times more likely to have functional capacities for improving children's nutritional status [OR=2, 90(9.2-30.1),p= 0.56] while in the intervention zone the marital status (married) of these CAC members was significantly associated with no link with the type of training received and their functional abilities, [OR=0.06(0.0-0.3), p<0.001] ; Knowledge of a balanced diet as a variety of foods from all food groups in appropriate proportions was not related to the marital status of CAC members in the control area [OR=0.57(0.0-7.4),p=0.999], whereas in the intervention zone the civil status (married) of these CAC members was significantly associated with their functional capacities, due to the training they had received beforehand as part of community strategies to combat malnutrition [OR=0.06(0.0-0.3), p<0.001]; No relationship was established between knowledge and practices regarding the number of days a child should eat (2 to 3 times a day) and the civil status of CAC members in the control zone, with OR=1.0(0.0-12.5) and 1.05(0.1-5) respectively, and no significant association was found with their functional capacity in these two study zones, p>0.05 ; In both the control and intervention zones, no significant relationship was established between the motivation of CAC members to carry out actions in the villages and their civil status in the context of improving the nutritional status of children under 5, p>0.05.

Table 4.15. Marital status of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

	Control zone				intervention Zone				Control / intervention
	. Civil status				. Civil status				
Variables	Married	not in a union (single, divorced, separated)	p-value (all)	p-value	Married	not in a union (single, divorced, separated)	OR(95% IC	p-value	p-value (all)
Type of training									
No answers	12(100)	0(0,0)	2,90(9,2-30,1)	0,56	10(71,4)	4(28,6)	0,29(0,0-1,6)	0,195	0,592
Community strategies	11(84,6)	2(15,4)			5(55,6)	4(44,4)			
Training on the signs of malnutrition	1(100)	0(0,0)			7(100)	0(0,0)			
Types of food, breastfeeding children	3(75,0)	1(25,0)			0(0,0)	0(0,0)			
Knowledge of a balanced diet									
A variety of foods from all food groups in appropriate proportions.	21(91,3)	2(8,7)	0,57(0,0-7,4)	0,999	17(77,4)	5(22,7)	0,06(0,0-0,3)	<0,001	0,302
Foods from only one food group.	2(100)	0(0,0)			1(33,3)	2(66,7)			
Any type of diet is considered balanced	4(80)	1(10)			4(80)	1(20)			
Number of times a day a child should eat									
Less than two meals	3(100)	0(0,0)	1,0(0,0-12,5)	0,999	1(100)	0(0,0)	1,0(0,1-5)	0,999	0,999
Two to three main meals.	9(90)	1(10)			14(73,7)	5(26,3)			
More than three times a day.	9(90)	1(10)			7(70)	3(30)			
According to the child's need and appetite.	3(100)	0(0,0)			0(0,0)	0(0,0)			
Three main meals and snacks between meals	3(75)	1(25)			0(0,0)	0(0,0)			
Motivates as a volunteer, to carry out CAC activities?									
No motivation	5(83,3)	1(16,7)	0,00(ND)	0,999	2(66,7)	1(33,3)	2,11(0,2-15,7)	0,589	0,518
Improving the health of children and women in my community	2(100)	0(0,0)			3(60)	2(40)			
Love for my own community	20(90,9)	2(9,1)			17(80,9)	4(19,1)			

4.16. Gender of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

It was found that in the control zone, men as members of CACs trained in community strategies were 1.3 times more likely than women to have functional capacities in improving the nutritional status of children [OR=1.30(0.26-7.2),p= 0.999], however in the intervention zone being a man as a member of a CAC was not significantly related to the community strategy training received in order to have good functional capacities in improving the nutritional status of children under 5, [OR=00.76(0.1-3.7), p=0.9991]; in both the control and intervention areas, CAC members' knowledge of balanced foods such as a variety of foods from all food groups in appropriate proportions was found to be significantly more related to men than to women in the context of good functional abilities to improve nutritional status, p<001. The motivation of CAC members to work as volunteers to improve the health of women's children was 7 times greater for men than for women in the control zone, whereas in the intervention zone, with OR=7.0(0.3-144.0) but no significant difference in functional abilities in the two zones, p>0.05.

Table 4.16. Sex of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

	Control zone				intervention Zone				Control / intervention
	Sex				Sex				
Variables	Male	Female	OR(95% IC	p-value	p-value (all)	Female	OR(95% IC	p-value	p-value (all)
Type of training									
No answer	7(58,3)	5(41,7)	1,30(0,26-7,2)	0,999	7(50,0)	7(50,0)	0,76(0,1-3,7)	0,999	0,127
Community strategies	10(76,5)	3(23,1)			5(55,6)	4(44,4)			
Training on the signs of malnutrition	1(100)	0(0,0)			6(85,7)	1(14,3)			
Types of food, breastfeeding children	4(100)	0(0,0)			0(0,0)	0(0,0)			
Knowledge of a balanced diet									
A variety of foods from all food groups in appropriate proportions.	18(78,3)	5(21,7)	0,13(0,0-0,8)	0,013	14(63,6)	8(36,4)	ND	<001	0,331
Food from a single food group.	1(50)	1(50)			1(33,3)	2(66,7)			
Any type of diet is considered balanced	3(60)	2(40)			3(60)	2(40)			
Number of times a day a child should eat									
Less than two meals	2(66,7)	1(33,3)	0,58(0,0-3,0)	0,082	1(100)	0(0,0)	1,27(0,2-5,8)	0,999	0,952
Two to three main meals.	8(80,0)	2(20,0)			11(57,9)	8(42,1)			
More than three times a day.	8(80,0)	2(20,0)			6(60)	4(40)			
According to the child's need and appetite.	2(66,7)	1(33,3)			0(0,0)	0(0,0)			
Three main meals and snacks between meals	2(50,0)	2(50,0)			0(0,0)	0(0,0)			
Motivates as a volunteer, to carry out CAC activities?									
No motivation	4(66,7)	2(33,3)	7,0(0,3-144,0)	0,289	1(33,3)	2(66,7)	2,14(0,3-32,2)	0,622	0,884
Improving the health of children and women in my community	1(50,0)	1(50,0)			4(80)	1(20)			
Love for my own community	17(77,3)	5(22,7)			13(61,9)	9(38,1)			

4.17 Level of education of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

The results of this table show that although the majority of those who knew how to eat a balanced diet and who had a high level of education were 1.16 times more likely to have good functional abilities in improving the nutritional status of children under 5, OR=1.16(0.2-0.4) but no significant difference was found among the variables studied, p>0,05.

Table 4.17. Level of education of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

	Control zone				intervention Zone				Control / intervention
	Level of study				Level of study				
Variables	Primary	High level (secondary and high school)	OR(95% IC	p-value	p-value (all)	High level (secondary and high school)	OR(95% IC	p-value	p-value (all)
Type of training									
Response	7(58,3)	5(41,7)	0,75(0,7-18,0)	0,141	6(42,9)	8(57,1)	0,81(0,1-4,1)	0,999	0,172
Community strategies	3(23,1)	10(76,9)			3(33,3)	6(66,7)			
Training on the signs of malnutrition	1(100)	0(0,0)			2(28,6)	5(71,4)			
Types of food, breastfeeding children	1(25,0)	3(75,0)			0(0,0)	0(0,0)			
Knowledge of a balanced diet									
A variety of foods from all food groups in appropriate proportions.	9(39,1)	14(60,2)	1,16(0,2(0,2-0,4)	0,999	7(31,8)	15(68,2)	0,46(0,0-2,4)	0,417	0,544
Food from a single food group.	1(50)	1(50)			2(66,7)	1(33,3)			
Any type of diet is considered balanced	2(40)	3(60)			2(40)	3(60)			
Number of times a day a child should eat									
Less than two meals	1(33,3)	2(66,7)			0(0,0)	1(100)			

Two to three main meals.	6(60,0)	4(40,0)	0,26(0,0-1,3)	0,139	8(42,1)	11(57,9)	1,93(0,3-9,6)	0,466	0,718
More than three times a day.	3(30,0)	7(70,0)			3(30)	7(70)			
According to the child's need and appetite.	1(33,3)	2(66,7)			0(0,0)	0(0,0)			
Three main meals and snacks between meals	1(25,0)	3(75,0)			0(0,0)	0(0,0)			
Motivates as a volunteer, to carry out CAC activities									
No motivation	2(33,3)	4(66,7)	0,0(ND)	0,151	1(33)	2(66,7)	1,18(0,1-8,4)	0,999	0,496
Improving the health of children and women in my community	2(100)	0(0,0)			2(40)	3(60)			
Love for my own community	8(36,4)	14(63,6)			8(42,1)	14(57,9)			

4.18. Occupation of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

It was found that in both the control and intervention zones, none of the variables studied had a positive influence on the occupation of CAC members in terms of their effectiveness and functional capacity in improving the notional state of children under 5, p>0.05.

Table 4.18. Occupation of CAC members surveyed according to factors favouring the functional effectiveness of CAC members in improving the nutritional status of children under 5.

	Control zone				intervention Zone				Control / intervention
	Occupation				Occupation				
Variables	Employed (Self-employed and salaried)	Non-employed (Agriculture and first aid)	p-value (all)	p-value	Employed (Self-employed and salaried)	Non-employed (Agriculture and first aid)	OR(95% IC	p-value	p-value (all)
Type **of training**									
No response	11(91,1)	1(8,3)	0,14(0,0(1,4)	0,137	11(78,6)	3(21,4)	0,00(ND)	0,534	0,543
Community strategies	9(69,2)	4(30,8)			9(100)	0(0,0)			
Training on the signs of malnutrition	1(100)	0(0,0)			7(100)	0(0,0)			
Types of food, breastfeeding children	4(100)	0(0,0)			0(0,0)	0(0,0)			

Knowledge of a balanced diet									
A variety of foods from all food groups in appropriate proportions.	20(87)	3(13)			18(81,8)	4(18,2)	0,64(0,0-6,8)	0,999	0,520
Food from a single food group.	1(50)	1(50)			3(100)	0(0,0)			
Any type of diet is considered balanced	4(80)	1(20)	0,37(0,0-2,8)	0,585	4(80)	1(20)			
Number of times a day a child should eat									
Less than two meals	2(66,7)	1(33,3)	1,41(0,1-10,2)	0,999	1(100)	0(0,0)	0,00(ND)	0,279	0,061
Two to three main meals.	8(80,0)	2(20,0)			16(84,2)	3(15,8)			
More than three times a day.	10(100)	0(0,0)			10(100)	0(0,0)			
According to the child's needs and appetite.	3(100)	0(0,0)			0(0,0)	0(0,0)			
Three main meals and snacks between meals	2(50,0)	2(50,0)			0(0,0)	0(0,0)			
What motivates you, as a volunteer, to carry out CAC activities?									
No motivation	5(83,3)	1(16,7)			3(100)	0(0,0)			
Improving the health of children and women in my community	2(100)	0(0,0)	ND	0,999	5(10à)	0(0,0)	ND	0,999	0,889
Love for my own community	18(81,8)	4(18,2)			19(90,5)	3(9,6)			

4.19. Linked to the CACs on the factors favouring the effective implementation of the functional capacities of the community facilitation units

The results of the multivariate analyses showed that despite the fact that the members of the CACs had received training on community strategies to combat child malnutrition in both the control zone (43.3%) and the intervention zone (30.0%), [OR=0.96 (0.45-2.05), p=0.928]; the knowledge of the CACs on the variety of foods from all the food groups in appropriate proportions to be given to children in the control zone (76.7%) and the intervention zone (73.3%), [OR=1.23(0.58-2.59), p=0.579]. 7%) and the intervention zone (73.3%), [OR=1.23(0.58-2.59), p=0.579]; CAC members who worked as volunteers to improve the health of children and women in my community were 1.57 times more likely to be effective in community activities to combat child malnutrition [OR=1.57(0.71-3.45), p=0.259]. But only the fact that the members of the CACs knew that a child should eat 2 to 3 times a day was identified as a factor favouring the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under five [OR=0.44(0.21-0.92), p=0.030].

Based on qualitative data, we have shown that the extracts highlight the crucial link between nutrition training for CAC members and the effectiveness of their work in promoting nutritional health within families and communities. This is why they recommended the availability of plumpy nut in health centres to help patients. From these statements, the following key words can be identified for understanding effectiveness: Targeted training for effective interventions: Nutrition training for CAC members enables them to acquire the knowledge and skills needed to carry out effective interventions within families and communities, by raising awareness of good nutritional practices and detecting cases of malnutrition; Impact at family and community level: Trained CAC members intervene with mothers and children within households, and with community relays at community level, thus reaching a wide range of people and maximizing the impact of their work; Liaison with health facilities: Community relays, trained by members of the CACs, play a crucial role in referring cases of malnutrition to the appropriate health facilities, ensuring adequate medical care; Recommendation for the availability of Plumpy Nut: Members of the CACs recommend the availability of Plumpy Nut, a ready-to-use therapeutic food used in the treatment of severe acute malnutrition, in health center for the effective management of malnourished children. It should be emphasized that training is an essential function in supporting these community participation bodies in order to do their job properly. The implementation of CACs does, however, require some serious time. It can be deduced

from this that nutrition training for members of the CACs is an essential element in strengthening their ability to promote nutritional health and improve the management of malnutrition within communities. From the effectiveness of nutrition training to the effectiveness of CAC work : The extracts highlight the crucial link between nutrition training for CAC members and the effectiveness of their work in promoting nutritional health within families and communities.

This is why they recommended the availability of plumpy nut in health centres to help patients. From these statements, the following key words can be identified for understanding effectiveness: Targeted training for effective interventions: Nutrition training for CAC members enables them to acquire the knowledge and skills needed to carry out effective interventions within families and communities, by raising awareness of good nutritional practices and detecting cases of malnutrition; Impact at family and community level: Trained CAC members intervene with mothers and children within households, and with community relays at community level, thus reaching a wide range of people and maximizing the impact of their work; Liaison with health facilities: Community relays, trained by members of the CACs, play a crucial role in referring cases of malnutrition to the appropriate health facilities, ensuring adequate medical care

"We work with the members of the CAC within the family, i.e. the mother and children, and at community level, it's the community relays who have to take the reports to the appropriate health structures".

"very often there is a tendency not to take enough time to train them, i.e. 2 days when they are not technicians - health, wash etc, they do not have the same capacity but due to a lack of resources, the subject is skimmed over but quality results are expected from them..." (Partner implementing nutrition programs/projects using CACs). (Partner implementing nutrition programs/projects using CACs).

. *"We work with the members of the CAC within the family, i.e. the mother and children, and at community level, it's the community relays who have to take the reports to the appropriate health structures".*

Table 4.19. linked to the CACs on the factors favoring implementation of the functional capacities of the community facilitation units

Variable	Baseline of Control zone	Baseline of Intervention zone	ORna* (95% IC	p-value	ORa** (95% IC	p-value
	n=30(%)	**n=30(%)**				
Type of training Received						
Training on the signs of malnutrition	1(3.3)	0(0.0)	3.2 (0.2-0.9)	0.004	0.96 (0.45-2.05)	0.928
Community Strategies	13(43.3)	9(30.0)				
Types of food, breast-feeding children	4(13.3)	5(16.7)				
Food production, essential family Practices	0(0.0)	2(6.7)				
Knowledge of a balanced diet						
A variety of foods from all the food groups in appropriate proportions.	23(76.7)	22(73.3)	1.81 (0.8-11)	0.002	1.23(0.58-2.59)	0.579
Foods from a single food group.	2(6.7)	3(10.0)				
Foods rich in sugar and fat	0(0.0)	0(0.0)				
All types of food are considered balanced	5(16.7)	5(16.7)				
knowing how many times a day the child should eat						
Less than two meals	3(10.0)	1(3.3)	3.1 (2.4-21)	0.005	0.44(0.21-0 .92)	0.030
Two to three main meals.	10(33.3)	19(63.3)				
More than three times a day.	10(33.3)	10(33.3)				
According to the child's needs and appetite.	3(10.0)	0(0.0)				
Three main meals and snacks between meals	4(13.3)	0(0.0)				
Motivation of CAC members, as volunteers, to carry out activities.						
No motivation	6(20.0)	3(10.0)	6.5 (2.0-20.7	0.001	1.57(0.71-3.45)	0.259
Improving the health of children and women in my community	2(6.7)	5(16.7)				
The love of my own community	22(73.3)	19(63.3)				
Participate in activities at CODESA level	0(0.0)	3(10.0)				

**ORna=Odds ratio unadjusted; **ORa=Odds ratio adjusted*

4.20. Household factors favouring effective implementation of the functional capacities of the Community Animation Cells .

The results of these tables show that, of the factors studied in the control and intervention zones and after multivariate analysis, only the fact that households knew they had to continue breastfeeding children aged 20 to 24 months was one of the factors significantly favouring the functional effectiveness of the CACs in improving the nutritional status of children under five, p<0.05. (**Table 4.20 and Table 4.21** summarize these results).

Table 4.20. Household factors favouring effective implementation of the functional capacities of the Community Animation Cells .

Variable			Baseline control zone	Baseline intervention zone	*ORna(95% IC)	P value	**ORa(95% IC)	P value
Distribution of appropriate portions at mealtimes								
Good functional capacity	Good nutritional status	I'm not sure about the portion size	17 (45.95)	07 (31.82)	16,81(1,3-33,5)	0,015	0,79(0, ,5-8,4)	0,245
		Yes, I serve age appropriate portions	15 (40.54)	02 (9.09)				
		No, I provide my child with adult-sized portions.	05 (13.51)	13 (59.09)				
Poor functional capacity	Poor nutritional status	I'm not sure about the portion size	33 (32.04)	34 (28.81)	1,92(0,9-3,8)	0,072	0,07(0,3-2,8)	0,904
		Yes, I serve age appropriate portions	57 (55.34)	13 (11.02)				
		No, I provide my child with adult-sized portions.	13 (12.62)	71 (60.17)				
Possession of vegetable gardens								
Good functional capacity	Good nutritional status	No	31 (83.78)	18 (81.82)	0,58(0,1-2,6)	0,697	0,5(0,2-10,7)	0,593
		Yes	06 (16.22)	04 (18.18)				
Poor functional capacity	Poor nutritional status	No	81 (78.64)	61 (51.69)	0,29(0,1-0,5)	<0,001	1,17(0,9-11,1)	0,064
		Yes	22 (21.36)	57 (48.31)				
Practical advice on continuing to breastfeed children aged 20 to 24 months								
Good	Good nutritional	Always	03 (8.11)	08 (36.36)				
		Often	05 (13.51)	01 (4.55)				

functional capacity	status	Very often	11 (29.73)	04 (18.8)	0,1(0,0-0,6)	0,013	2,04(1,2-48,8)	0,029
		Not at all	18 (48.65)	09 (40.91)				
Poor functional capacity	Poor nutritional status	Always	19 (18.45)	37 (31.36)	0,4(0,2-0,9)	0,03	1,90(0,02-0,9)	0,047
		Often	17 (16.50)	18 (15.25)				
		Very often	27 (26.21)	12 (10.17)				
		Not at all	40 (38.83)	51 (43.22)				

**ORna=Odds ratio unadjusted; **ORa=Odds ratio adjusted*

Table 4.21. Household factors favouring effective implementation of the functional capacities of the Community Animation Cells .

Variable			Baseline control zone	Baseline intervention zone	*ORna(95% IC)	P value	**ORa(95% IC)	P value
knowledge about feeding children from 0 to 6 months								
Good functional capacity	Good nutritional status	Breast milk only	11 (29.73)	11 (50.0)	2,3(0,7-7,0)	0,165	0,2(0,2-5,1)	0,775
		Breast milk with other Food	26 (70.27)	11 (50.0)				
Poor functional capacity	Poor nutritional status	Breast milk only	60 (58.25)	88 (74.58)	2,1(1,1-3,7)	0,014	1,15(0,8-11,8)	0,084
		Breast milk with other Food	43 (41.75)	30 (25.42)				
Number of meals the child must eat per day in this household								
Good functional capacity	Good nutritional status	At least 2 meals a day	20 (54.05)	10 (45.45)	0,4(0,1-1,1)	0,109	1,34(0,5-27,9)	0,185
		2 to 3 meals per day	12 (32.43)	12 (54.55)				
		More than 3 meals per Day	05 (13.51)	0 (0.0)				
		As required	0 (0.0)	0 (0.0)				
		3 meals a day with rusty Causes	0 (0.0)	0 (0.0)				
Poor functional capacity	Poor nutritional status	At least 2 meals a day	35 (33.98)	35 (29.66)	2,2(1,2-3,8)	0,004	0,54(0,5-5,8)	0,381
		2 to 3 meals per day	34 (33.01)	62 (52.54)				
		More than 3 meals per Day	27 (26.21)	19 (16.10)				
		As required	06 (5.83)	01 (0.85)				
		3 meals a day with rusty Causes	01 (0.97)	01 (0.85)				

**ORna=Odds ratio unadjusted; **ORa=Odds ratio adjusted*

Coordination at local level

During the qualitative analyses, it was shown that setting up a framework for regular meetings of all the CACs in a health area would make it possible to direct the support of certain partners based on different sectors in favour of children. It will be necessary to ensure that there are the required standards (defining, for example, the number of reports to be submitted, performance criteria, incentive indicators to be defined, etc.) in terms of the availability of a solid base where they will have to meet to present the activities of each CAC and within this coordination assess the performance and skills of the CACs. This framework would still allow for exchanges of experience under the guidance of staff with expertise in the field. (Framework of the DPS-SK).

It's a good idea for all the players to get together to promote multi-sector coordination at local level in implementing the actions to be taken in the community.

However, it is important to understand that the other sectors do not seem to be very active in the health zone in terms of supporting the efforts of the CACs, and the fact that all the other sectors of life are slacking off weakens the level of coordination at local level. On some occasions, for certain community projects. Similarly, it was shown that the CACs are not used by other sectors apart from health:

" ... this approach is more effective when each player has to play a multisectoral role, especially within the CAC, and when everyone has to bring their expertise and knowledge to bear in order to boost the development of their community, because even at provincial level this multisectoral coordination remains relevant, Through the actions of each individual, we can see that there is a convergence or link between the different interventions and guidelines, which enable those working in the field to act in a synergistic and convergent manner in order to produce the same results' concluded a nutritionist from the DPS-SK.

"we observe close collaboration between the CACs and other development bodies such as the CLD: at meetings, too, there are times when they are always together ...', said an official from the Bagana health area.

'CACs do not work with other sectors apart from health ...' but these same CACs also participate in village development activities. The people in charge of the Tshigoma health area said.

Mo***nitoring, supervision, evaluation and technical support for the health zone and CACs***

Monitoring and evaluation activities must be planned by the health center team in order to understand the problems associated with malnutrition in children and other vulnerable groups highlighted in the CAC reports. Implementing measures to monitor and support the CACs in order to ensure that their actions are sustainable will ensure that the CACs continue to play their role. It has been observed that the health zone itself does not benefit from technical supervision of the CACs (specific supervision by the DPS) As they do not have an outline of the reports used for CAC activities, the health centres have to make do with the reports of CAC meetings, which do not even provide information on process indicators, l*et al*one performance indicators in the health areas.

Monitoring and supervision remain weak at health center level after the CACs covering their area. Bagana health area has adapted timetables for CAC visits as part of the routine activities to be organized in the various villages. But a community dynamics officer also supports the CACs in their daily work, and this is done through results, exchanges of experience are carried out between the CACs with regard to the progress made by other members. This is only possible during home visits (visible results that lead to exchanges of experience between CAC members, which makes the work of the CACs increasingly plausible) in Bagana health area. Similarly, in Tshigoma health area, and in the context of strengthening monitoring, it has been shown that no member of the ECZ of the health area comes to the field just for the CAC issue, and this weakens the system for monitoring and evaluating CAC activities in the villages.

Unfortunately, these sectors give the impression that the CACs are more closely linked to health, but this means that the CACs are not more functional. The community relays must send their reports to the CAC level after a summary has been made and this report will then be sent to the health center to take action in relation to the issues raised (in terms of problems), hence supervision takes on its meaning to be a routine scheduled at the le el of the health center. There are no reporting forms for the members of the CACs. The answers below illustrate these results:

"Really, unless friends and colleagues contradict me, we have never seen a member of the DPS come just to supervise the CACs in the health zone, ...imagine being a state service if you don't have an injunction from the intermediate level, ... we won't be doing imaginary things ... so things that make no sense ...". "It is difficult to track down even the reports that come out of this body when there are no effective management tools to manage and supervise these CACs...". Says the focus group participants and the BCZ executive.

"We just hold meetings, and sometimes we compile reports of the meetings and send them to CODESA", said a health center manager in charge of community dynamics.

"The CA simply sends the message to the health center so that the members of the CACs come to the health center, he passes the message on to the CACs and then returns to the zone office", says a health center manager.

"An effective monitoring, support and evaluation system must be put in place for CACs by permanent government bodies, in particular the central office of the health zone and the health areas, in collaboration with other sectors, EPST, the health and safety office and the food industry.....". (National Pronanut).

"I only draw up a schedule of visits as part of the monitoring of nutrition activities, and we share the concerns and possible solutions of certain CACs, but it is difficult to cover all the CACs in a month for several reasons, in particular the activities at the health center and the resources available", said one of the managers of Tshigoma health center.

Normative and legal framework on CACs (being one of the community participation bodies). Existence of guides on the management and operation of CACs.

It was shown during several interviews that to date in the DRC, there are certain official documents at the level of the general secretariat for health on the establishment of community participation

structures including the CAC, Several of these documents are designed as guides at the level of the Ministry of Health.

Nevertheless, at the level of the health centers, as for the operational manuals, it was shown by the managers interviewed that they have these manuals in which we can find the roles and responsibilities of the CACs *"if you want I can show it to you now."* affirmed a manager of the Health Training.

"……this originates mainly in the guide for implementing community-based nutrition…" "…each year there are guidelines, circular notes, which are given to the head doctors of the health zone who must have an AC and a Nutritionist next to them in order to support the establishment of these CACs" and beyond these manuals, there are guidance notes which allow the process to be supported at the grassroots level It must be recognized, however, that these CACs remain a gateway for sustainable actions at the community level". Declared a nutritionist executive of the DPS-SK.

Challenges/ difficulties

This CAC structure finds it difficult to function properly due to a lack of motivation and the time spent working as a CAC member. The lack of support from the government and partners means that the CACs are regressing and demotivated. It can be said that the effectiveness of CAC members is also affected by the type of support offered to CACs.

However, it was noted that the CACs were set up at a time when there was a lot of support in the health zone and everyone claimed that being a member of the CACs gave them the opportunity to have enough money, yet it is stipulated that a RECO is a volunteer. This even undermines the definition of a CAC member and a community relay. We can therefore observe that once support is suspended, the CACs become No-functional versus less effective, even for those that remain (statement by a manager in Bunyakiri health zone).

Can we say that the CACs are supported when one partner takes charge of 5 members per example out of a total of 19 CACs and each has 12 members ? Wouldn't this also make the

Work of the other members less effective, as they could also work harder according to their role and responsibility ? A focus group participant wondered whether this would have an impact on the results in the field, given that the prevalence of malnutrition in this health zone remains a cause for concern.

It is difficult to find a CAC with meeting reports to monitor and evaluate the way it does its work", said an official from Fosa Bunyakiri. As a result, Bagana health area also showed that : the low motivation of the CACs, which has an impact even on the holding of meetings and activities at village level, the poor training of CAC members on a permanent basis and without refresher courses can also have an impact on their effectiveness, and the low level and lack of funds following the No-alignment in the budget of the health centre and health zone of the activities of the CACs at village

level (able to support refresher courses, support for some routine activities, etc.) are among the obstacles/challenges encountered by the CACs in the fight against child malnutrition in this Bagana area. Tshigoma health area did not remain indifferent, pointing out that operational support for the CACs (because the work requires material and financial support) to enable them to carry out home visits, and IGAs that had not worked well because of poor management on the part of the CAC managers were among the major challenges facing the CACs. Another challenge is that we are trying to have CACs everywhere, beyond the low resources available to the actors who support the setting up or revitalization of CACs.

In the light of the above, we can see that Community Animation Cells are faced with financial, material and human resource constraints that limit their ability to carry out their activities at village or CAC level. This hinders the implementation of effective programs and initiatives at community level to improve the nutritional status of children under 5. Community animators need specific training to acquire the skills needed to carry out more effective community animation activities. Insufficient training sessions limit their ability to mobilize the community and promote social change in the area of child nutrition, as does the lack of adequate technical support from skilled services.

Added to this is the fact that the Community animation Cells have difficulty in obtaining the necessary support from local authorities, governmental organizations or external partners. Lack of institutional support and motivation can compromise the sustainability of initiatives and limit their long-term impact.

"When you find a CAC member who goes beyond the work they do in the community and manages to make a significant contribution to reducing disease, particularly child malnutrition, they find themselves having to go and find what they are missing in order to provide for their family, and this is due to a lack of motivation," said a nutritionist from the DPS-SK.
"...but when there is no support from partners you will see a regression in the performance of the CACs..." said this nutritionist from the DPS-SK.
"A partner who promises to support a CAC, but curiously brings us, for example, two boots for a team of 12 people, or even both, and sometimes the support given to the CACs is only taken up by the CAC presidents ", said a participant from Bunyakiri ECZ.

Results in line with research objective 3: To test the effectiveness of the established functional capacities of the Community Animation Cells in improving the nutritional status of children under five in South Kivu-DRC.

Functional capacities of CAC members in improving the nutritional status of children under five in Bunyakiri health zone

4.22. Knowledge of households and CACs in terms of child nutrition.

The results in Table 4.22. reveal that in the control zone, households were found to have a high level of knowledge of the number of times a child should eat per day, i.e. at least 3 meals per day, and this knowledge increased to 37.2% after the study, i.e. the number of meals a child aged between 6 and 24 months should eat per day. Whereas this increase was 25% in the intervention zone, with significant links with the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5 years of age, $p<0.001$. Similarly, a significant difference was observed between the control and intervention zones in terms of the functional capacities of the CACs, $p<0.001$. In terms of knowledge of the recommended age for the introduction of semi-solid foods, no significant differences were observed between the control and intervention zones, $p>0.05$.

The knowledge of manages on a balanced diet as a variety of foods from all food groups had regressed by 17.2% with a significant difference observed, $p=0.007$ while in the intervention area, an increase of 17.8% of households who knew a balanced diet as a variety of foods from all food groups but with significant links associated with the effective implementation of the functional capacities of CACs in improving the nutritional status of children under 5 years, $p=0.000$; However, no significant difference was observed between these two zones during the intervention, $p=0.782$. These results are supported by those collected qualitatively, based on focus groups, individual interviews and experiences during the intervention:

Breastfeeding practices and complementary feeding in the community.

Community members have demonstrated the usefulness of complementary food for children. It is clear that community members want to give their children complementary food in order to maintain the health of the children in the community.

"*'in 6 months because it helps the child to grow well, helps to protect against illness' (United States).*

However, despite the awareness campaigns and the work of CAC, some women have still not managed to comply with exclusive breastfeeding because of the work in the fields and the quest for survival. 'Here with us, it depends on each individual, finding the one who reaches 6 months is really difficult, the one who forces herself here reaches 3 months and starts feeding her' (Nyabikumba).

Premature, prolonged introduction of No-maternal foods.

Members of the community believe that it is appropriate to introduce No-maternal foods prematurely in order to contribute to the child's physical and mental growth. Milk is important, but many women in the community prefer to introduce the meal early to allow the woman to carry on with her normal activities. Before the operation, breastfeeding is important for every child who wants to grow on all levels (emotional, psychological, social and physical). For this reason, community members are aware of the need to breastfeed their children for the first five years of their lives. By way of illustration, a member of the community speaks out; The responses to the pre-

intervention surveys showed that nutrition plays a vital role in protecting children against disease and contributes to their good health during the first five years:

Community members provided information on the length of breastfeeding practised, in terms of years. The duration of breastfeeding varied: participants reported breastfeeding until the next pregnancy, 3 years, 2 years, and sometimes shorter. However, certain constraints, such as economic insecurity, are mentioned as a motivation for introducing food prematurely, with mothers seeking to space out feedings so that they can go about their subsistence activities. Community members' lack of knowledge about duration can be seen from their opinions, which are divergent and adapted to the life of each member of the community.

However, before the intervention, the results had shown that the community members did not have sufficient knowledge about balanced nutrition and most of them did not make it available to them to combat child malnutrition in this community.

: *"Yes, if you breastfeed the child from 0-6 months he can have strength and good health, but when you go to see the mother yourself you don't eat well, and when the child reaches 3 months you start feeding him because you yourself don't have enough food to breastfeed the child, but also the effect of leaving the child alone at home to go to the field also causes stunted growth in the child"* (United States).

"The importance of a child's diet in the first five years can be seen in the rapid development of the child and its evolution on all levels. But it also helps the child to find his appetite throughout his life on this earth" (Tshigoma).

"I feed my children quickly, even at 2 months", and he went on to say that boiled food is considered to be an experimental start with light foods: *"First he takes his mother's milk and after 6 months he takes boiled food"* (Tshigoma).

"*food that strengthens the person and food that contains proteins*" (participants from Tshigoma and the United States).

Table 4.22. Household heads' knowledge of nutrition and the nutritional status of children under 5 years in Bunyakiri health zones

	Control					Intervention					Control/intervention
	Baseline	Endline	% change	χ^2	P value	Baseline	endline	% change	χ^2	P value	
											p-value(all)
Number of meals a child aged between 6 and 24 months should eat per day											
1 meal/ day	29(20,7)	3(2.1)	18.6)			15(10.7)	9 (6.4)	4.3			
2 meals/ day	74(52.9)	48(34.3)	18.6			84(60.0)	55(39.3)	20.7			
At least 3 meals a day/Other	37(26.4)	89(63.6)	37.2	0.00	<0.001	41(29.3)	76(54.3)	25	0.00	<0.001	<0.001
The age recommended for the introduction of semi-solid foods:											
2 months	7(5.0)	15(10.7)	5.7			12(8.6)	7(5.0)	3.6			
Around 6 months	133(95.0)	125(89.3)	5.7	0.12	0.118	128(91.4)	133(95.0)	3.6	0.34	0.342	0.745
Household knowledge of a balanced diet											
Variety of foods from all the food groups	109(77.9)	85(60.7)	17.2			85(62.9)	113(80.7)	17.8			
Foods from a single food Group	9(6.4)	18(12.9)	6.5	0.00	0.002	13(9.3)	14(10.0)	0.7	0.00	0.000	0.782
Foods rich in sugar and fat.	13(9.3)	6(4.3)	5.0			17(12.1)	1 (0.7)	11.4			
All types of diet	9(6.4)	31(22.1)	15.7			25 (17.9)	12 (8.6)	9.3			

4.23. Knowledge on the training of Community Animation Cells workers in nutrition for children under 5 years.

From the results of this table 4.23, it can be seen that the support of technical and financial partners in nutrition training had a significant influence on the effective implementation of the functional capacities of the CACs in improving the nutritional status of children, and differences between these two zones, including the control and intervention zones, were observed (p=0.034).

In addition to the quality results found in this research, it is important to understand that; a *raining for CAC members:* Appropriate training for the members of the Community Animation Cells has played an important part in the performance and functional effectiveness of the CACs. It was the gateway to all CAC action.

Prior to the intervention, there was a lack of interest in training CAC members, especially those who were not organized, monitored and supported in the context of promoting a balance in the functioning of all the bodies of community participants in the Bunyakiri health zone in the promotion of child health affected by the scourge of malnutrition. Although they have been in existence for a very long time, the various training courses from which some of the CACs benefited are over 2 years old and lasted only one day for 3 to 4 hours. This meant that it was not possible to complete all the planned subjects and modules relating to nutrition and the management of malnutrition at community level. This training should be framed and formalized on the basis of subjects to be discussed and exploited by the trainers. Not only should financial resources be taken into account, but also and above all the relevance of the training to the functional effectiveness of the CACs in their role and responsibilities, so as to contribute effectively to the development and improvement of the nutritional status of children under 5 and other vulnerable groups. However, the study showed that, with the relevance and interest shown in the subject and the training modules made available by certain partners through the national nutrition program, training courses should last between 3 and 8 days, from 8 a.m. to 4 p.m. in the evening. This would not only equip the CACs well, but also make them more effective in the field.

"...if we could make these training sessions a steersman for the rest of our activities, no CAC would be able to fail in its mission, because we have noticed that training is the basis of everything for our CACs, ... Today, we know how to fill in depot and enumeration forms, orient women to ANC and CPOS activities, etc., all thanks to the training and the various tools and modules received during the training organized prior to this study..." continued a member of the Nyabikumba CAC (intervention zone) during supervision visits to their village.

Table 4.23. Knowledge on the training of Community Animation Cells workers in nutrition for children under 5 years.

Control						Intervention					Control/intervention
Variable	Baseline	Endline	% of change	χ^2	p-value	Baseline	endline	% of change	χ^2	p-value	p-value (all)
	n=30(%)	**n=30(%)**				**n=30(%)**	**n=30(%)**				
Have received training (CAC member role)											
Non	12(40.0)	13(43,3)	3.3	0.00	0,999	14(46.7)	11(36,7)	10	0.27	0.60	0.713
Yes	18(60.0)	17(56,7)	3.3			16(53.3)	19(63,3)	10			
Trainer/support (who provided the training)											
Partners	13(43.3)	13(43,3)	0.0	15.8	0.004	12(40.0)	11(36,7)	3.3	6.6	0.004	0.034
MOH	5(16.7)	5(16,7)	0.0			3(10.0)	6(20,0)	10			
No training Received	12(40.0)	6(20,0)	(20)			15(50.0)	9(30,0)	0.0			
FBO	0(0.0)	0(0.0)	0.0			0(0.0)	1(3,3)	3.3			
Other	0(0.0)	6(20,0)	20			0(0.0)	3(10,0)	10			
Adapting training to work as a CAC Member											
No	13(43.3)	14(46,7)	3.4	0.26	0.60	19(63.3)	9(30,0)	33.3	0.07	0.78	0.585
Yes	8(100.0)	16(53,3)	46.7			11(36.7)	21(70,0)	33.3			

4.24. Knowledge on tools and work aids used by members of Community Animation Cells teams on nutrition in children under 5 months.

Tools to support CAC members: Minister's counting booklet Advice card (good nutritional practice). Leaflets had risen from 3.3% at the start of the study in the control zone to 16.7%, an increase of 13.37%, with a similar increase in the intervention zone, from 16.7% to 26.7%, an increase of 10%. This knowledge in support of the work tools of the CAC members significantly influenced the functional capacities of these CAC members, $p<0.001$. CAC members' knowledge of manual reporting significantly influenced their functional capacity to improve children's nutritional status, both in the control zone, where there was a 33.3% increase after intervention, and in the intervention zone, where there was a 38.7% increase after study, $p<0.05$. CAC members' knowledge of Not growing or gaining weight at the expected rate (slow growth), Changes in behaviour, such as unusual irritability, slowness or anxiety. Oedema, Low energy levels and fatigue more easily than other children as visible signs of malnutrition in children under 5 had a significant influence on their functional abilities in both the control and intervention zones, with statistically significant differences in both zones, $p<0.05$ (***Table 4.24***).

After the qualitative analyses, we also found, the results showed that the CAC had received a number of tools to help them carry out their actions in the field. However, these tools did not last very long. As far as the supplier of tools is concerned, the results show that the Ministry of Health is still involved in helping the CAC to better materialize their actions and support their actions by guaranteeing them the necessary working tools. One woman acknowledged that she had benefited from the tools in previous years, but stressed the impact the tools had had on her work. However, in the information system between the CACs and the health zone through the health areas, there is not yet an effective information system that would allow reporting and documentation of CAC activities at health zone level. However, there is a mechanism for meetings at community level, the contents of which are shared with the health areas through the CODESA and CDC before the central office of the health zone is informed of what is happening at community level, although there is no quantified evidence in terms of CAC performance monitoring indicators. In addition to the health zone, the health areas targeted by the research do not also have management tools that can be used to obtain information on the evolution of indicators at the level of each village or CAC, which makes the information system very handicapped at the level of the health facility and makes it difficult to know the efforts of the CACs through the activities they are carrying out. This was reported by almost all the managers of the health center targeted by the study. The reports of the meetings sent to the central office of the

health zone do not obtain any feedback that would enable the health centre team to improve their performance or to continue strengthening the members of the CACs, as the case may be. In the focus group organized at the operational level, i.e. at the level of the health zone and Bunyakiri health areas, With regard to the availability of monitoring forms or CAC tools, it was shown that these tools do not exist in Bagana health area. Building the capacity of the actors (CA, CDC, and CAC) will enable everyone to understand their role and responsibility in monitoring and supporting the CACs so that the objectives set can be achieved in accordance with the manuals and guidelines available. What complicates reporting with tools in French for a community that cannot read and write French at times, while it is they who have to wait for the data, is the need for these tools to be flexible according to the context and the category of people who have to use them ?. In designing the tools, we need to look at the overall work done by the CAC, and at community level it's better to have systems that allow us to be alert and for each member to have a small number of manages that they will monitor until the children are fully recovered (About a Donor to the health and nutrition programme in the DRC).

" The minister's notebook, the pen and the test to screen children in the community, but until today we can no longer have any of these tools because they have been damaged "(Tshigoma).
A member of CAC says: *The tools we had before, we received from the Ministry of Health, which is always concerned about our actions, and the funding came from TP0 (Tshigoma).*
" *Our respondents showed that at present, CAC members receive no financial assistance to help them do their work as community relays, and this has an impact on their results in the field* (Bagana).
"Today, we don't get anything from our partners. We received the tools we use in the past (Tshigoma)".
"In 2020-2021, we had a few tools that helped us to do our work better, in particular: the hoe, the watering can, the mackintosh, the buckets and the chemical fertilizers for use in our plantations. (Bagana) "
"...to date, to tell the truth, there is no suitable tool available to collect this factual information. As a member of the health zone management team, we have not yet set up a community feedback system across the health areas to obtain information from them about the activities carried out", said two members of the health zone management team.
"...we don't get any feedback from the BCZ on the reports that are often sent out..." said one of the managers of Tshigoma center. - Make available the necessary tools to enable members of the CACs or community relays to carry out their work properly. For example, mackintoshes, waistcoats, chasubles**,** *"... if someone has had the courage to go into a village in the rain during awareness-raising activities, I think that if we find them a mackintosh, it will encourage them more..." says a manager at the DPS-SK;*
"...there are no tools available at the level of the CACs to record information or the activities carried out by the members of the CACs, and at the level of the health zone there are no management tools available to provide feedback to the health areas that closely follow these CACs ...".One of the participants went on to say that *"apart from the small duplicating papers used, these tools do not exist in this zone".*
"These forms do not yet exist here in Bagana", said a Bagana health area manager.

"*We all need to have the capacity and management tools we need to carry out our work in the field*.

(Head of AS in Tshigoma)

"...with these tools, some members of active CACs who cannot read and write find it difficult to fill in the data properly...» (Partner implementing nutrition projects/programs in the DRC).

Tool donors

The materials given to CAC members will be of no importance if they are not accompanied by operating costs to ensure the viability of the Community Animation Cells unit.

In addition, during the course of this study, the results also focused on the analysis of the tools put in place and therefore: analyse des outils testés (nouveaux et anciens intégrant des nouveaux indicateurs de suivi et évaluation), leur motivation, les résultats et leur importance.

Supervisons des activités et actions des cellules d'animations communautaires au niveau des villages suivant le circuit de communication.

(i) Tool 1: Template for CAC (Community Animation Unit) activity supervision report by health zone central office (details in appendix)

(ii) Tool 2: Template for CAC (Community Animation Unit) activity supervision report by the health center (details in appendix)

(iii) Tool 3: Report on the supervision of CAC (Community Animation Unit) activities by the CODESA (Health Development Committee) of the health center (details in appendix).

These tools are innovative and essential for monitoring the activities of the CACs, which are the basis for health actions in the villages of the health areas. The absence of these tools had meant that the health zone was unable to capitalize on actions aimed at improving the health status of malnourished children under 5 years of age, and was unable to engage in community-based activities because it had no fluid knowledge of what was happening in the communities. However, the tools integrated during the intervention and followed up during the process have enabled health structures to have permanent data on which they can base their operational planning, in addition to other data from multiple sectors. They also make it possible to have data that was previously only available in partial form, and which was sometimes imagined by certain structure managers or by certain presidents of CACs, CODESAs etc., but since they have been implemented or put in place, they have shown their importance in collecting and centralizing data from the CACs, and their appropriation would help the Congolese health structures and system to have relevant tools that can support the compilation of data from the different villages in the health zones in a permanent manner and without too many estimates, but rather based on reported realities (following a normal bottom-up reporting circuit).

Accompanying the CACs by a supervisor or monitor with the support of the centers has shown how much more effective and plausible the appropriation and understanding of the tools is within the CACs, and has enabled the data management and reporting tools for the activities carried out in the

various villages or community animation cells to be filled out properly. (CAC).

Monitoring and reporting on the activities and actions of the Community Animation Cells at village level, following the communication circuit.

(i) Tool 1: Report outline monitoring and reporting of CAC (Community Animation Unit) activities by the Bureau Central de la Zone de Santé (BZCS) through its executive team (ECZS). *(ii) Tool 2: Template for the monitoring and reporting of CAC (Cellule d'Animation Communautaire) activities by the CDC (Community Dynamics Officer) /IT/ ITA (Permanent and/or Permanent Assistant Nurse); (iii) Tool 3: Template for monitoring and reporting on CAC (Community Animation Unit) activities by the CODESA (Health Development Committee).*

These tools contain information and multi-sectoral performance frameworks involving the fields of neutrino, health, water, hygiene and sanitation, protection, education, food security and gender, with a strong focus on monitoring and coordinating the actions and activities of the Community Animation Cells in the villages for joint and coordinated action in the prevention and management of malnutrition in children under 5 at community level, through a community-based approach centered on the work of the CACs.

The indicators reported can be found in the appendices (model attached) These tools trace the cases of malnourished children at community level, the actions taken by the community to prevent these cases at community level through awareness-raising, the promotion of community and individual fields (plot gardens), the rearing of small livestock, referral to a care structure and all this is recorded in these tools and enables the political and health authorities to orient their policies and actions in villages that already have well-triangulated and reported information in addition to being documented. In these specific cases, the structures lacked the means to get to grips with CAC's work.

The introduction of monitoring and reporting frameworks for CAC activities at the level of each CAC has facilitated permanent monitoring of players at the level of each village, and enables reliable operational planning based on the challenges and contributions of stakeholders, in order to guide strategic decision-making at the operational and intermediary levels of the Congolese health system. The answers below illustrate these results:

“ *We are given tools, but they don't support us in the follow-up and they don't give us CAC operating costs so that if we need them we can also support ourselves without their intervention”* Tshigoma.

"On the one hand, *we can say that the tools we receive from our partners help us to carry out our various activities. On the other hand, these tools are not enough on their own if the people who fund us do not guarantee us appropriate follow-up after we have used them”.*Tshigoma.

“ *The first team left with the necessary tools to help us, but later we got notebooks and reporting tools to help us do our job better”.* Bagana

"At first, we rarely went out into the field to find out about the activities of the CACs, because whenever we needed information, we would call the CAC presidents and tell them what was happening in their community, with a lot of paperwork, and since we've made available the community data reporting template for each village, we're able to report the real health problems in each village and take action on any concerns or problems identified during the reporting period or with alerts we've been having... ... ",

"after the president of the CAC reported using these tools, we noticed that there were several women in need of ANC and CPS sessions, and given the importance and relevance of the data, we thought it would be a good idea to implement an advanced strategy in this village/CAC in order to catch up with these pregnant and breastfeeding women and babysitters", said a community dynamics officer from one of the health areas involved in the study.

"we should integrate these frameworks into the day-to-day management of the health zone, because they're very important during this period, as they already provide us with documentation that everyone can draw on and guide the decisions of both the zone's management team and the health zone's strategic direction in terms of preventing and managing malnutrition at community level", declared a health zone manager.

"Before, I couldn't know what was going on in the villages directly, we only had a small meeting report sheet that we thought had collected information, but alas, no. These tools, on the other hand, have met our expectations and we can already capitalize on them, even waiting for the results of your study..." asserted a manager from the Bunyakiri health zone who benefited from the study.

Table 4.24. Knowledge on tools and work aids used by members of Community Animation Cells teams on nutrition in children under 5 years

	Control					**Intervention**					**Control/intervention**
Variable	Baseline	endline	% of change	χ^2	p-value	Baseline	Endline	% of change	χ^2	p-value	p-value(all)
A tool to assist CACs in their work	n=30(%)	n=30(%)				n=30(%)	n=30(%)				
Type of tools and help provided to get the job done											
Minister's counting book	11(36.7)	15(50,0)	13.3	--	0.004	15(50.0)	10(33,33)	(16.67)	--	0.002	0.003
Minister's counting booklet Advice card (good nutritional practice). Leaflets	1(3.3)	5(16,67)	13.37			5(16.7)	8(26,7)	10			
Minister's counting book. Image box	2(6.7)	2(6,7)	0.0			1(3.3)	2(6,7)	3.4			
Advice card (good nutritional practice), Key messages booklet, Minister's counting booklet	3(10.0)	0(0.0)	(10)			4(13.3)	0(0.0)	(13.2)			
Prevention framework, Image box. Leaflets	2(6.7)	0(0.0)	(6.7)			0(0.0)	0(0.0)	0.0			
Other generic tools	1(3.3)	8(26,67)	23.37			5(16.7)	10(33,33)	16.63			
Knowledge of the visible signs of child malnutrition											
Low energy levels and fatigue more easily than other children, Changes in behaviour, such as unusual irritability, slowness or anxiety.	2(6.7)	4(13,3)	6.6			2(6.7)	2(6,7)	0.0			
Not growing or gaining weight at the expected rate (slow growth), Changes in behaviour, such as unusual irritability, slowness or anxiety. Oedema, Low energy levels and fatigue more easily than other children	14(46.7)	17(56,7)	10	0.00	0.001	14(46.7)	11(36,7)	(10)	0.00	0.001	0.999
Oedema	1(3.3)	0(0.0)	(3.3)			1(3.3)	0(0.0)	(3.3)			

Oedema, Low energy levels and fatigue more easily than other children 2. Behavioural changes, such as unusual irritability, slowness or anxiety.	10(33.3)	7(23,3)				9(30.0)	11(36,7)	6.7			
(1)PB less than 125 mm (2) Oedema (3) Not growing or gaining weight at the expected rate (slowed growth)	2(6.7)	2(6,7)	0.0			4(13.3)	5(16,7)	3.4			
Other (please specify)	1(3.3)	0(0.0)	(3.3°			0(0.0)	1(3,3)	3.3			

4.25. Knowledge of Community Animation Cells workers on the nutrition of children under 5 year,

It has been shown in Table 4.25, CAC members' knowledge of the introduction of semi-solid foods after breastfeeding increased by 3.6% in the control zone but with no significant difference, whereas in the intervention zone this increase was 43.3% with a statistically significant difference observed, p=0.001. However, there was a significant difference between the level of knowledge of CAC members in the control and intervention zones, p=0.016.

Table 4.25. Knowledge of Community Animation Cells workers on the nutrition of children under 5 year,

	Control					Intervention					Control/intervention
Variable	baseline	Endline	% of change	χ^2	Sig.	Baseline	Endline	% of change	χ^2	Sig.	p-value(all)
Knowledge of nutrition	n=30(%)	n=30(%)				n=30(%)	n=30(%)				
Continue breastfeeding even after the introduction of solid foods/complements.											
Yes, breastfeeding should continue alongside solid food until at least 2 years of age.	27(90.0)	28(93,6)	3.6	0.99	0.99	9(30.0)	22(73,3)	43.3	0.00	0.001	0.016
Only if the baby refuses solid food	1(3.3)	1(3,3)	0.0			7(23.3)	5(16.7)	(6.6)			
Only if the mother wants to continue	2(6.7)	1(3,3)	(3.4)			14(46.6)	3(10.0)	(36.6)			

4.26. Knowledge of the roles and responsibilities of the members of the Community Animation Cells in relation to the nutrition of children under 5 years of age

The results in Table 4.26 demonstrate that at the start of the study in the control zone, only 6.7% of CAC members knew their roles and responsibilities, whereas after the study this proportion had risen to 23.3%, with an increase in knowledge of 16.6% but no significant differences observed (p=0.145): (1) Scheduling consultation meetings with the village/cell population (2) Ensuring the security of the materials and equipment assigned to the villages/cells (3) Transmitting information to CODEV and CODESA (4) Centralising the data collected in the community (5) Organising meetings to analyse the information collected. (6) Feedback to the village at the general assembly 5. Develop and implement the community action plan and maintain the village facilities with the participation of all the key actors in the village. (7) Organise regular meetings to monitor and evaluate the community action plan (8) Ensure the mobilization of local resources to implement the local development plan (e.g. maintenance of water points) (9) Develop and implement local emergency response plans, was known by 3.3% of CAC members at the start of the study but after the intervention, the proportion was 26.7% and with a significant difference observed is in this area, p=0.025 and in both areas in terms of improved knowledge of roles and responsibilities, p=0.003.

During the focus groups and individual interviews, in addition to the reality experienced during the intervention, qualitative data on the roles of CAC members was evoked in terms of knowledge as follows: Looking back at the respondents' perception of the roles of a member of the Community Animation Cells unit, it was found that its members play several roles within the community. One of these roles is to screen malnourished children and those at risk of malnutrition in the locality in question. Other respondents said that the role of the CAC member was to raise community awareness of the development activities of their entities, especially in terms of hygiene and environmental sanitation. Next, the other members said that the CAC member must intervene in the agro-pastoral activities carried out within the community. Their role is to raise awareness of the importance of agriculture and livestock farming. Its agro-pastoral activities aim to prevent the risks of malnutrition in the various districts. Hence, according to them, the members of the CACs lead and educate parents about children's illnesses and how to prevent illnesses in the community. The 4-star diet (protein, strength, etc.). The success of the CAC members' role is seen when there is a noticeable decrease in cases of illness and malnutrition in the community. Participants also thought that a CAC member should be active and frequently available at health facilities (health centres, etc.). Even before the intervention, it was shown that the CACs played an important role in improving the nutritional status of children under 5 in the community. As a result, a number of

statements were made to the effect that: During this period, it was observed that several members were confusing the task and role of a Community Relay with that of a CAC member. For some, there is no clear distinction between a member of the CAC and a community liaison officer, especially as both work for the development of the community, but it is at the level of roles and responsibilities, i.e. at the functional level, that there is a nuance.

The following illustrations explain in detail.

"Raising awareness in the community, making home visits, assessing the state of health of the community and going through households to inform people about how to prevent kwashiorkor disease". (Focus group interview, CAC USA).

"The members of the CACs have the role of detecting malnutrition in children who have been abandoned by their parents and taking them to the health centre in order to improve the population's state of health". (Nyabikumba focus group interview).

"... , Mr. Researcher, in my opinion, a member of the CAC must play an outreach role by going into the communities to encourage parents to talk about children under 5 suffering from malnutrition and to see how the state of health can be improved, he must make parents and communities aware of how to protect themselves against diseases that may arise in order to preserve the health of children under 5**.** ***".*** *(Focus group interview***,** *United States CAC***).**

The role of the CAC is to awaken the population or, in other words, to make the members of the community aware so that they are responsible for a balanced diet to prevent malnutrition in our village. ". (Tshigoma focus group interview);

"Sir, the role of the Community Animation Cells is to advise pregnant and breastfeeding women on the type and quality of food we can give our children to prevent malnutrition. It also assesses the state of health of our children and advises us on the measures we need to take to monitor the state of health of our children in our communities ".

Table 4.26. Knowledge of the roles and scope of application of the members of the Community Animation Cells with regard to nutrition in children under 5 years of age. .

	Control					**Intervention**					**Control/ intervention**
Variable	Baseline	Endline	% of change	χ^2	p-value	Baseline	Endline	% of change	χ^2	p-value	p-value(all)
Knowledge of the roles	***n=30(%)***	***n=30(%)***				***n=30(%)***	***n=30(%)***				
Roles as a member of the CAC											
(1) Organisation of meetings to analyse the information Collected.	1(3.3)	1(3.3)	0.0			0(0.0)	0(0.0)	0.0		0.025	
(1) Centralisation of data collected in the community (2) Transmission of information to CODEV and CODESA (3) Development and implementation of the community action plan and maintenance of village facilities with the participation of all key actors in the village (4) Scheduling of consultation meetings with the village/cell population	2(6.7)	2(6.7)	0.1			5(16.7)	9(30.0)	13.2			
(1) Scheduling consultation meetings with the village/cell population (2) Ensuring the security of the materials and equipment assigned to the villages/cells (3) Transmitting information to CODEV and CODESA (4) Centralising the data collected in the community (5) Organising meetings to analyse the information collected. (6) Feedback to the village at the general assembly 5. Develop and implement the community action plan and maintain the village facilities with the participation of all the key actors in the village. (7) Organise regular meetings to monitor and evaluate the community action plan. (8) Ensure the mobilisation of local resources to implement the local development plan (e.g. maintenance of water points) (9) Develop and implement local emergency response plans.	2(6.7)	7(23.3)	16.5			1(3.3)	8(26.7)	23.2			

(1) Organisation of meetings to analyse the information collected (2) Transmission of information to CODEV and CODESA (3) Development and implementation of the community action plan and maintenance of village facilities with the participation of all key actors in the village (4) Development and implementation of local emergency response plans (5) Ensuring the security of materials and equipment assigned to villages/cells (6) Scheduling of consultation meetings with the village/cell population.	5(16.7)	2(6.7)	-10	0.14	0.145	1(3.3)	1(3.3)	0.0	0.03		0.003
Transmission of information to CODEV and CODESA. Organise regular meetings to monitor and evaluate the community action plan, Ensure the mobilisation of local resources to implement the local development plan (e.g. maintenance of water points) (4) Draw up and implement local emergency response plans.	6(20.0)	2(6.7)	(13.3)			4(13.3)	1(3.3)	-10			
Ensure the mobilisation of local resources for the implementation of the local development plan (e.g. maintenance of water points), Organise regular meetings to monitor and evaluate the community action plan (3) Develop and implement the community action plan and maintain village facilities with the participation of all key actors in the village.	2(6.7)	4(13.3)	6.6			1(3.3)	3(10.0)	6.7			
Draw up and implement local emergency response plans (2) Draw up and implement the community action plan and maintain village facilities with the participation of all key actors in the village, Ensure the mobilisation of local resources to implement the local development plan (e.g. maintenance of water points)	4(13.3)	4(13.3)	0.0			8(26.7)	3(10.0)	(16.7)			
Ensure the security of the materials and equipment assigned to the villages/cells Ensure the mobilisation of local resources for the implementation of the local development plan (e.g. maintenance of water points), Feedback to the village at the general meeting, Transmission of information to CODEV and CODESA	1(3.3)	2(6.7)	3.4			2(6.7)	1(3.3)	(3.4)			
I don't know (I follow others as they do)	7(23.3)	6(20.0)	(3.3)			8(26.7)	4(13.3)	(13.4)			

4.27 Knowledge of technical assistance and motivation of the community members outreach units on nutrition in children under 5 years

In the control zone, support in terms of tools for CAC work improved after the study, rising from 3.3% to 13.3%, i.e. an increase of 10% in terms of proportion, but with no significant difference, p=0.333. In the intervention zone, however, this increase was 23.3%, with a statistically significant difference observed in this zone, p=0.025. Nevertheless, comparing the control zone and the intervention zone in the framework of improving the functional capacities of the CACs in improving the nutritional status of children under 5 years of age by having appropriate support, had no significant impact after the intervention, p=0.008 . However, the type of support provided to the members of the CACs in the intervention zone was significant compared with those provided to members in the control zone, in particular the Operating costs, Provision of income-generating activities, Provision of market garden seeds ; These tools were estimated at 6.7% in this zone, rising to 46.7% after intervention, p=000. Similarly, this difference between the control zone and the intervention zone in terms of the type of support received by the CACs was significant, p=0.011 (Table 4.27).
The support provided by technical and financial partners was significantly linked to the functional capacities of the CACs in both the control and intervention zones, p=000.

In addition to this support in the form of tools for the work of the CACs, during the interviews and focus groups, it was shown that the support was multiform and that it contributed to the smooth running of activities at village level by the members of the CACs. monitoring, supervision of health center team members, health zone central office and a community-level attendant (research part).
By the way, the monitoring and supervision are essential steps in supporting and ensuring the success of a sectoral process and program. During this intervention period, the health zone community animator, for the very first time, visited the CACs during zonal and joint (health center, health zone and research team) supervisory visits, i.e. two programmatic visits per month to the CAC and the health area. This reinforced the level of ownership of the actions by CAC members, who were able to use the tools well and play their roles and responsibilities, given that the visits were programmed and held in order to assess their level of functionality in the field. However, given the workload of the community dynamics officer at the health center, this did not rule out follow-up visits at least twice a month to keep a close eye on the work of the CACs. This enabled her to monitor certain cases of malnutrition at community level with CAC members, and to accompany certain home visits. This monitoring and supervision activity has further strengthened the work and effectiveness of the CACs at village level, as they feel that they are visited and monitored, and that they should give their best for the well-being of children in terms of nutrition and other vulnerable groups in the

villages.

In fact, support through monitoring and supervision by the health zone management team and the health center team, as well as a facilitator in the village or CAC on a regular basis, i.e. at least once or twice a month, helps to improve the services offered by the CACs in improving the nutritional status of children under 5. But also for IGA support, Availability of an income-generating activity and support for market gardening.

So much so that the Nyabikumba and Etats-Unis CACs were virtually No-existent and/or No-functional in their respective health areas. During the intervention, members of the CACs and all the communities met in all the community fields to grow amaranths, eggplants and onions in support of the CACs' market gardening for the benefit of the manages of children under 5 identified in the CACs. In addition, to support the IGAs, guinea pigs have been distributed to members of the CACs and to households with children under 5, with a rotating system set up in each CAC in the two health areas.

However, support for market gardening (amaranths, aubaergines, onions...) and IGAs (Cobayes) supervised at village level, with the presence of a permanent supoervisor in the village/CAC with ongoing basic training in animal husbandry and food crops and/or market gardening are important factors in the harmonious development of the village/CAC and the effective fight against malnutrition in improving the nutritional status of children under 5 in the Bunyakiri health zone.

Availability of work tools

Work tools have greatly contributed to the functional efficiency of the CACs in the health areas concerned by the intervention. Although before the CACs did not have enough tools for their work, after training CAC members during the intervention, work tools were provided: training modules for use during awareness-raising sessions, print-outs for use during the rainy season during visits and community work in the village/CAC, backpacks or briefcases for CAC members to carry the various reporting tools for activities to be carried out or done in the CAC, cases for storing reporting tools during home visits. During the intervention, these tools enabled the CACs to be more active than before, especially as certain prerequisites that were preventing those from working properly were made available to them. In addition, reporting tools were made available to the CACs, such as reference tokens, CAC reporting templates, enumeration notebooks, screening forms and so on. All the CACs should have these tools so that they can have data in an orderly fashion and at the right time, enabling them to make objective plans based on the realities of the villages and not on suppositions, which is often the case in structures where the CACs are not well organized in terms of reporting.

"With the presence of our community field, social cohesion around child and family nutrition has been strengthened in our village, and we are going to work with community members in our

community field, and evaluate our IGA in the manages that benefited from the first and second rounds...". said a member of CAC USA during the intervention:
"Moreover, when our amaranths didn't grow well because of the bad weather, we reinforced this with onions, and this reinforces our active participation in CAC activities in our village..." added a woman with a child under 5 who benefited from amaranths and onions from the community field in CAC USA (intervention zone).
"If we are to be thankful, our IGA has given a new sense of proactivity to CAC activities, which were already abandoned, with members virtually No-existent, but with the advent of IGAs and the market garden seeds we have benefited from, everyone has become active ....."
"...all our weekly plans are followed and CAC members are more present in the manages assigned to them according to the requirements of the health center ...." added the majority of Nyabikumba CAC members during the speech.
"....We have received the tools we need for our activities....." said a member of CAC Nyabikumba (intervention zone).

"...we are now able to work easily because we no longer have any reporting problems, as we have the tools at our disposal at all times, but this support has also helped us to be strong in our exchanges with each other", said a member of CAC Etats-Unis (intervention zone).
"Since the intervention, we have felt the importance of having the necessary tools available in our structures and in the CACs, as they enable us to trace the indicators and information collected for the health centers", asserted the Bunyakiri and Tshigoma health facilities (intervention zones).
"...before, it was only a question of basing ourselves on a meeting report, and now we're satisfied with a CAC report without any indicators, plus information on community problems which are not well identified or described..." declared a manager from the Bunyakiri health zone during the intervention.

Table 4.27. Knowledge of technical assistance and motivation of the members of the Community Animation Cells on nutrition in children under 5 years.

	Control					Intervention					Control /intervention
Variable	Baseline	Endline	% of change	χ^2	p-value	Baseline	Endline	% of change	χ^2	p-value	
Technical assistance, motivation	n=30(%)	n=30(%)				n=30(%)	n=30(%)				
Support for CAC's work.											
Supporting the operating costs of partners in the health zone, Supplying vegetable seeds, Providing work equipment	1(3.3)	4(13.3)	10	0.35	0.353	1(3.3)	8(26.6)	23.3	0.03	0.025	0.008
Financial incentives for routine activities	2(6.7)	3(10.0)	3.3			4(13.3)	4(13.3)	0.0			
Provision of certain working tools by the health zone central office, Provision of income-generating activities	2(6.7)	2(6.7)	0.0			0(0.0)	1(3.3)	3.3			
Provision of income-generating activities, Provision of market garden seeds, Provision of work equipment	4(13.3)	4(13.3)	0.0			10(33.3)	15(50.0)	16.7			
Management tools at community level (registers, prevention plans,)	3(10.0)	7(23.3)	10.3			3(10.0)	0(0.0)	(10)			
Other (please specify)	18(60.0)	10(33.3)	(26.7)			12(40.0)	2(6.6)	(33.4)			
Support structure or body received for the CAC											
MOH,	4(13.3)	4(13,3)	0.0	0.02	0.019	5(16.7)	5(16,7)	0.0	0.00	0.006	0.000
Partners	13(43.3)	22(73,3)	30			14(46.7)	25(83,3)	36.6			
FBO	1(3.3)	0(0.0)	(3.3)			0(0.0)	0(0.0)	0.0			
Other	12(40.0)	4(13,3)	(26.7)			11(36.7)	0(0,0)	(16.7)			

4.28. Perception/attitude on the functional capacities of the members of the Community Animation Cells in terms of nutrition in children under 5 years

The results in Table 4.28 reveal that the cultural/traditional beliefs on nutritional practices in the control zone did not change significantly p=0.147 whereas in the intervention zone, this change linked to the poor cultural and traditional perceptions on nutritional practices increased by 93.6% in the manages of children under 5 in the different villages with statistically significant links linked to the effective implementation of the functional capacities of the CACs. This difference was observed between the control and intervention zones during the study. However, the usefulness of the members of the CACs in the fight against malnutrition was much more appreciated in the intervention zone during the study than in the control zone, with a very significant difference linked to the implementation of the functional capacities of the CACs in improving the nutritional status of children under the age of 5, p=0.003. A significant difference was also observed between the control and intervention zones, p=0.001.

In the course of this research, no significant relationship was found between the perceptions of the members of the CACs with regard to their functional capacities in improving the nutritional status of children under 5 years of age at the baseline and final study levels in the control zone and in the intervention zone (p>0.05). Similarly, no statically significant difference was found between the two study areas, p=0.999.

Similarly, although there were no significant differences between the attitudes of the members of the CACs towards their functional capacities to improve the nutritional status of children under 5 in the control zone and the intervention zone (p=0.261). *The results from the qualitative data also have in this same part that :* This point analyses and evaluates the level of knowledge of the members of the various Community Animation Cells in relation to nutrition. After the intervention, it also analyses the members' perception of nutrition. Throughout this section, we present the results according to the training of the members running the CAC. In this section of the work, attention will be focused much more on a few themes such as the purpose of the training, the duration of the training, the actors involved in the training and the links between the training and the function of the members of the various CACs. It should be noted that this section will conclude with some recommendations from the respondents regarding the effectiveness of the training.

This section also assesses the perceptions of the members of the various Community Animation Cells regarding malnutrition. We therefore present the results of the various focus groups, with particular emphasis on continuous nutrition, balanced nutrition, a balanced diet and the symptoms of malnutrition. However, the factors of a balanced diet in the household, the impact of training on

a balanced diet in the household, nutrition training and household support and the effectiveness of nutrition training towards the effectiveness of CAC work will be presented in this section of the work.

Availability of human capital.

During the intervention, at least every CAC member had two days of home visits to the *household* to raise awareness of nutrition and other essential family practices. These activities took place every evening, in view of the village's agricultural activities and the search for the daily bread of the heads of households. Home visits were made between 4pm and 6:30pm, when most of the heads of household had already returned from their fields, and some visits were made between 6am and 8am, especially in the manages of women with children under 6 months old. It was observed that each member did an average of 8 hours of community work (VAD) every two weeks.

Table 4.28. Relationships between household attitudes regarding nutrition and nutritional status in Bunyakiri Health Zone.

	Control					Intervention					Control/Intervention
	Baseline	Endline		χ^2	Sig.	Baseline	Endline		χ^2	Sig.	p-value(all)
Cultural/traditional beliefs about eating practices											
No	127(90.7)	118(84.3)	(6.4)	0.14	0.147	127(90.7)	10(7.1)	(83.6)	0.00	0.000	0.000
Yes	13(9.3)	22(15;7)	6.4			13 (9.3)	130(92.9)	93.6			
The usefulness of CAC members in the fight against malnutrition											
No	80(57.1)	68(48.6)	(8.5)	0.15	0.123	66(47.1)	41(29.3)	(17.8)	0.00	0.003	0.001
Yes	60(42.9)	72(51.4)	5.5			74(52.9)	99(70.7)	17.8			

***Table 4.29*. Table. Perception/attitude on the functional capacities of the members of the Community Animation Cells in terms of nutrition in children under 5 years**

Control						Intervention					Control/intervention
Variable	Baseline	Endline	% of change	χ^2	Sig.	Baseline	Endline	% of change	χ^2	Sig.	p-value(all)
Attitude/perception	**n=30(%)**	**n=30(%)**				**n=30(%)**	**n=30(%)**				
Perception of the participation and role of CAC members in improving nutrition and appreciation by other partners.											
Yes	22(73,3)	24(80,0)	8.7	2.3	0.07	27(90,0)	26(86,7)	(3.3)	0.00	0.06	0.990
No	8(26,7)	6(20,0)	(6.7)			3(10,0)	4(13,3)	3.3			
Community members' attitudes to CAC activities in the villages											
Very bad	3(10.0)	2(6,7)	(3.3)	0.55	0.09	0(0.0)	3(10,0)	10	0.63	0.466	0.261
Bad	3(10.0)	7(23,3)	13.3			3(3.3)	2(6,7)	3.4			
Neutral	3(10.0)	0(0.0)	(10)			1(3.3)	0(0.0)	(3.3)			
Good	18(60.0)	19(63,3)	3.3			23(76.7)	18(60,0)	(16.7)			
Very good	3(10.0)	2(6,7)	(3.3)			5(16.7)	7(23,3)	6.6			

4.30. Practices on the functional capacities of members of Community Animation Cells teams in nutrition for children under 5 years.

For households, the results in Table 4.30, show that although there was an increase of 10 ; 7% of households that gave their child under 5 appropriate portions during the meal, no significant difference was observed with the functional capacities of the CACs in this control zone, p=0.097, whereas in the intervention zone, there was an excessive increase in the number of households that gave their child appropriate portions during the meal, i.e. an improvement of 57.9%, with statistically significant links to the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5. There was also a significant difference between the changes observed in the control zone and the intervention zone, p=0.000.

The application of the roles and responsibilities of the members of the CACs in the control zone went from 35% to 28.6%, p=0.304 After the study in the intervention zone, the majority of households stated that the members of the CACs played their roles in the same way as at village level, and this had significant links with the effective implementation of the functional capacities of the CACs, p=0.000. As a result, a statistically significant difference was observed between the two post-intervention zones in the functional capacities of the CACs in improving the nutritional status of children under 5, p=0.005.

In the control zone, home visits did not change after the intervention period (p=0.699), whereas in the intervention zone after the study, an increase of 31.1% of households showed that visits made by members of the CACs had changed, which was significantly associated with the implementation of the functional capacities of the CACs in the fight against malnutrition, p=0. 000. In addition, a significant difference was observed between the control zone and the intervention zone in terms of CAC visits to households, p=0.001. The involvement of households in the selection or election of CAC members had no influence on the implementation of CAC functional capacities in the control and intervention zones, and there was no difference between these two zones, p>0.05.

It emerges that in the control zone the evolution has remained stable, i.e. an increase of 0%, whereas in the intervention zone after the study, there has been an increase of 10% in the number of CAC members who are trying to play their role correctly as CAC members, in particular by: Mobilize local resources (ii). Participate in the planning of nutrition and health activities in the village/neighbourhood (iii). Coordinate nutrition and development activities in the village: (iv) Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children).de meme, No significant differences were observed between the situation in the control zone and that in the intervention zone (p<0.05) (Table 10). In support of the qualitative

data, the roles played by the members of the CACs were summarized by several respondents during the focus groups and individual interviews, while participant observation reinforced the narrative

The role of Community Action Units (CACs) in the fight against malnutrition

After the speech, some members of the community acknowledged the role played by the CAC in the community. They are aware of the actions undertaken by the CAC. It is clear that the CAC is playing its role well in certain areas of the community.

.they guide the child's access to health care. They raise awareness about vaccinations, they raise awareness about how to feed children, and they raise parents' awareness about the importance of taking children to the health center in the event of illness. We regret that CAC members are often forgotten when something small happens, even though they are working in the interests of the community. It has to be said that the role of the CAC in these different environments is complex, in the sense that some members recognise the importance of CACs in the community in improving the nutritional status of children under the age of 5. The activities carried out by CAC members to raise awareness in the community constitute a recognition framework for some community members, although the geographical sphere of awareness-raising is small, as community members state:

Prior to the intervention, in various focus groups, community members noted that the role of the CACs was to contribute to local development and to improving the nutritional status of children under 5. A relevant statement in relation to the roles of the CACs: Before the intervention, however, there were still gaps in communication and a clear understanding of the responsibilities of the CACs. *During the intervention period, the CACs and members of the community or manages positively changed the narrative on the roles and responsibilities of the CACs in improving the nutritional status of children under 5.*

"They also have the role of seeking information in relation to care in order to improve health, they are involved in development activities" (Tshigoma).

"The CAC goes into houses (home visits) to raise awareness and train people, but I don't know if "I have never understood the name. It is your arrival that lets me know that it exists in our community of CAC members". (Tshigoma). *"it's this cell I'm talking about that you're referring to"* (Tshigoma).

Table 4.30. Household practices in relation to the functional capacities of CACs in improving the nutritional status of children under 5 in Bunyakiri health zone

	Control					Intervention					control/intervention
	Baseline	endline	% of change	χ^2	Sig.	Baseline	endline	% of change	χ^2	Sig.	
											p-value(all)
Distribution of appropriate portions at mealtimes											
I'm not sure about the portion size	50(35.7)	27(19.3)	(16.4)			41(29.3)	25(17.9)	(11.4)			
Yes, I serve age appropriate portions	72(51.4)	87(62.1)	10.7	0.09	0.097	15(10.7)	96(68.6)	57.9	0.00	0.000	0.000
No, I provide my child with adult-sized portions.	18(12.9)	26(18.6)	5.7			84(60)	19(13.6)	(46.4)			
Role and responsibilities of CAC members											
No	91(65)	100(71.4)	6.5	0.30	0.304	108(77.1)	67(47.9)	(29.2)	0.00	0.000	0.005
Yes	49(35)	42(28.6)	(6.4)			32(22.9)	73(52.1)	20.2			
Visits from CAC members											
No	94(67.1)	98(70.0)	2.9	0.69	0.699	90(64.3)	46(32.9)	(31.4)	0.00	0.000	0.001
Yes	46(32.9)	42(30.0)	(2.9)			50(35.7)	94(67.1)	31.4			

Table 4.31. Practices on the functional capacities of members of Community Animation Cells teams in nutrition for children under 5 years. .

Control						intervention					Control/intervention
Variable	Baseline	Endline	% of change	χ^2	Sig.	Baseline	Endline	% of change	χ^2	Sig.	p-value(all)
Role(s) played by the CAC in the community	**n=30(%)**	**n=30 (%)**				**n=30(%)**	**n=30(%)**				
Participate in planning nutrition and health actions in the village/neighbourhood	1(3.3)	3(10.0)	6.7			3(10.0)	9(30.0)	20			
(i) Participate in the planning of nutrition and health actions in the village/neighbourhood (ii). Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children, etc.) (iii). Draft and submit reports to CODESA.	3(10.0)	4(13.3)	3.3			10(33.3)	1(3.3)	(30)			
(i) Implementing and monitoring decisions taken (ii). Participate in the planning of nutrition and health actions in the village/neighbourhood (iii). Mobilise local resources (iv). Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children, etc.).	4(13.3)	1(3.3)	(10)	0.99	0.999	1(3.3)	1(3.3)	0.0	0.35	0.353	0.107
(i) Implementation and monitoring of decisions taken (ii). Mobilise local resources (iii). Draft and submit reports to CODESA.	1(3.3)	4(13.3)	10			1(3.3)	1(3.3)	0.0			
(i) Mobilise local resources (ii). Participate in the planning of nutrition and health activities in the village/neighbourhood (iii). Coordinate nutrition and development activities in the village: (iv) Organise a population census and identify vulnerable groups (pregnant and breastfeeding women, malnourished children).	4(13.3)	4(13.3)	0.0			1(3.3)	4(13.3)	10			

Draft and submit reports to CODESA.	4(13.3)	4(13.3)	0.0			4(13.3)	6(20.0)	6.7			
(i) Draft and submit reports to the CODESA. (ii) Coordinate nutrition and development actions in the village: (iii) Organise regular community meetings on the results of the community weighing and on practices to be promoted or solutions to problems identified by the CACs.	4(13.3)	8(26.6)	13.3			6(20.0)	2(6.7)	(13.3)			
Other (please specify)	9(30.0)	0(0.0)	(30)			2(6.7)	3(10.0)	3.4			

4.32. Practices on the functional capacities of the members of the Community Animation Cells in relation to the nutrition of children under 5 years

From the results in **Table 4.32**, Although the motivation of CAC members was low before the intervention in both the control and intervention zones, after the intervention the majority of CAC members were more motivated to work as volunteers to improve the health of children and women in their communities. This increase was 67% in the control zone and 30% in the intervention zone, with a significant influence on the effective implementation of functional capacities in both zones ($p<0.05$). However, there was a statistically significant difference between the intervention and control zones ($p<0.001$). In support of the qualitative results, we can say that, over and above this type of motivation evoked by the members of the CACs throughout the intervention, the importance of the motivation of these members in their activities remains far-reaching, as they had emphasised during the various focus groups and interviews conducted in addition to the reality experienced during the intervention. The fact that CAC members were not paid on a monthly basis was observed to be one of the factors demotivating them, despite their willingness to serve the community and their dedication and involvement in the fight against child malnutrition. Throughout the intervention, it was noted that lack of motivation was an important factor in the respect of certain plans by CAC members during home visits by exile and the follow-up of children discharged from health facilities due to malnutrition.

In short, the factors associated with the effectiveness of the functional capacities of the community animation cells during the intervention include training for CAC members and village chiefs, taking into account the time available, i.e. at least three days, the availability of work tools, an income-generating activity and support for market gardening, the regular holding of meetings by CAC members and the availability of human resources to carry out activities in the community, as well as the motivation of CAC members.

Table 4.32.. Practices on the functional capacities of the members of the Community Animation Cells in relation to the nutrition of children under 5 years

	Control					Intervention					Control/intervention
Variable	Baseline	Endline	% of change	χ^2	Sig.	baseline	Endline	% of change	χ^2	Sig.	p-value(all)
	n=30(%)	**n=30(%)**				**n=30(%)**	**n=30(%)**				
Motivation of CAC members, as volunteers, to carry out activities.											
No motivation	6(20.0)	4(13,3)	(10)	0.00	<0,001	3(10.0)	8(26,7)	6.7	0.02	0.025	<0,001
Improving the health of children and women in my community	2(6.7)	22(73,3)	67			5(16.7)	14(46,7)	30			
The love of my own community	22(73.3)	4(13,3)	60			19(63.3)	8(26,7)	(36;6)			
Participate in activities at CODESA level	0(0.0)	0(0.0)	0.0			3(10.0)	0(0.0)	(10)			
Information system: tool used during work as a CAC											
Household register	13(43.3)	8(26,7)	(16;6)	0.05	0.052	5(16.7)	3(10,0)	(6.7)	0.99	0.999	0.132
Household register, Logbook/enumeration book, Screening register	1(3.3)	7(23,3)	20			5(16.7)	6(20,0)	3.4			
Logbook/cahier de dénombrement	1(3.3)	3(10,0)	6.7			9(30.0)	9(30,0)	0.0			
Screening register	0(0.0)	3(10,0)	10			1(3.3)	7(23,3)	20			
Other (please specify)	15(50.0)	9(30,0)	(20)			10(33.3)	5(16,7)	(16.6)			

4.33. Household factors related to the effective implementation of the functional capacities of CACs in improving the nutritional status of children under 5 years of age

After a multivariate analysis of the variables linked to the activities of the CACs in the households of children under 5 before and after the intervention, it was found that several factors determine the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5, in particular : The knowledge of households to continue breastfeeding after the introduction of solid foods until at least the age of 2 and the number of meals per day (at least 3) to give the child, as well as their knowledge of balanced nutrition as a variety of foods from all food groups in appropriate proportions; the fact that members of manages believe that the CACs are fulfilling their role and responsibilities at community level; the promotion of good practices of key moments of hand washing ; and good practices observed by households in feeding children aged between 6 and 24 months that they should give at least 3 meals a day; in addition to the practices of breastfeeding children at least 8 times a day applied and known by households; the possession of vegetable gardens or plots; the consumption of drinking water in the household (water from a standpipe, an improved spring and a tap) and the active participation of manages in the elections of CAC members in each village ($p<0$;05) (Table 4.33).

After analysing the qualitative data in support of the indicators studied, several interviewees and focus groups of households and CACs showed that :

Involvement of community members in the activities of the Community Development Unit.

Community members have shown that they take part in activities organised by CAC in the community, with strong collaboration between community members and CAC members, with the aim of finding solutions to the health problems of children under the age of 5 who are malnourished and preventing malnutrition in those who have not yet developed it. Before the intervention, it was shown that community members attend CAC activities in the community. It is understood that the measures for assisting community members and participating in CAC activities in the community consist, on the one hand, of having the will to work for one's community by making sacrifices and, on the other, of being accepted by CAC members. However, community members are aware of the crucial role played by CACs in mobilizing the community to promote health, development and well-being in the various communities. CAC members play an important role in raising awareness in the community. They give parents the guidance they need to feed their children properly so that they do not fall into malnutrition. They try to find a waiting area between the local health zones. In these communities, they act as a bridge between the community and the health system or health centre, facilitating communication and collaboration between the two. However, the different opinions of the participants underline

the essential role of the community relays and members of the CACs in promoting health and improving access to healthcare for children under the age of 5 within the communities. By raising awareness, providing guidance and acting as intermediaries between the community and the health system, community relays contribute to better health and well-being for all. The challenges of building the capacity of CAC members and community relays also arise at this level.
It is important to raise awareness within the community in order to reduce the rate of malnutrition in children under 5 at community level. To this end, it would be better to equip CAC members with the necessary resources to encourage them to adopt new approaches in the fight against malnutrition in the community.

"We take part with them, making us aware that gardening can help us, but it *also teaches us how to keep our surroundings clean" (Bunyakiiri).*
"I've already worked with them. First they came to visit, then they advised me on how to give my children balanced food and how to live with my children.
" First we encourage them, then they give the things they can give to malnourished children, ". (Nyabikumba);
CAC's contribution to improving the nutritional status of children under the age of five. Raising awareness and facilitating access to health services

The members of CAC carry out awareness-raising activities to inform members of the community about how to combat malnutrition, specifically for children under 5. Being a research intervention zone, this shows that the CACs are highly effective in improving the nutritional status of children under five through a firm commitment at community level. This makes them more functional and able to respond to community needs in terms of prevention and community management of malnutrition in children under 5. But if we take a look before the intervention, we see that, with the declarations of community members, the CACs play an essential role in promoting the health and well-being of communities by improving access to nutrition, healthcare and information. Their involvement in awareness- raising and community mobilization had a positive impact. CACs play a crucial role in mobilizing communities to monitor agricultural production and promote community participation in agricultural development. By facilitating production monitoring, encouraging community participation and fostering collaboration, CACs help to build the resilience of farming communities and improve their livelihoods, with the aim of improving the nutritional status of children under the age of 5.

"They come sometimes, but not very often, to raise people's awareness about health and to guide those who want to go to hospital, because no one goes to hospital unless they are guided by the members of the community relays" (Nyabikumba).

Involvement in community activities : It is clear that the CAC is making an effective contribution to improving the nutritional status of children in certain areas, especially in the intervention zones. "Another member added: *" Yes visits the community, and when they arrive he teaches us how to prepare 4-star food".*

"we also respect what they teach us, but we lack the seeds and tools, so they only make us aware but we don't see any results, which means we don't give them our report". Another member added*:*

"The CAC helps us to improve children's health, because they know where aubergine seeds come from, where amaranth seeds come from, but thanks to them we have found these seeds" (United States).

"Yes, the CAC makes the visit, gives us advice, gives us the medicine, measures and weighs it, and gives the children the plympy" (United States).

"yes he forces himself, the effect of giving us his teachings, but also he tells us to protect ourselves against bedridden, how to prepare food" (United States).

***Table 4.33*. Household factors linked to the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5 (logistic-base and endline regression for all zones).**

	Adjusted OR	95% IC		p-value
Households' knowledge of how to continue breastfeeding after the introduction of solid foods until at least the age of 2, through the CACs	1,044	1,095	7,378	0,032
Household knowledge of the number of meals per day (at least 3) to give the child through the CAC activities	0,689	1,017	3,9	0,045
Household knowledge of a balanced diet being a variety of foods from all food groups in appropriate proportions through the CACs	1,021	0,154	0,845	0,019
Perceptions of manages that CACs are fulfilling their role and responsibilities as CAC members	1,046	0,131	0,944	0,038
Household practice of key handwashing times as a result of CAC activities	1,193	0,145	0,634	0,002
Feeding practices of children aged 6 to 24 months in the household at least 3 meals a day as a result of CAC activities	1,226	1,644	7,058	0,001
Children breastfeeding at least 8 times a day thanks to CAC activities	1,132	1,499	6,415	0,002
Possession of vegetable gardens by children's households through CAC activities in the villages	1,066	1,425	5,917	0,003

Consumption of drinking water in the household (fountains, springs and taps) as a result of CAC activities	0,928	1,282	4,988	0,007
Participation of manages in the elections of CAC members in your village	1,624	1,374	18,729	0,015

4.34. Analysis of CAC member effectiveness indicators

The results in ***Table 4.34*** and Figure 4.1 show that during the intervention period from February to April 2024, CACs became more effective and functional based on performance indicators. At the community level, the proportion of children aged 0-6 months who were exclusively breastfed increased by an average of 23% in the intervention zone (from 47.6% in February to 93.6% in April 2024), while it decreased by an average of 12% in the control zone (from 80.7% to 58.2%). For children aged 20-24 months, the proportion continuing breastfeeding increased by an average of 33% in the intervention zone (from 28.9% to 93.5%), compared to an 8% increase in the control zone (from 35.26% to 50%). By April 2024, the proportion of children aged 6-24 months receiving adequate complementary food (at least 3 meals a day and a 4-star ration) rose by an average of 13% in the intervention zone (from 47.6% to 68.1%), while it decreased by 1% in the control zone (from 52.7% to 50.2%). Additionally, the proportion of pregnant and breastfeeding women receiving a 4-star diet increased by an average of 19% in the intervention zone (from 47.6% to 84.9%), but decreased by 3% in the control zone (from 83.2% to 79.6%). The proportion of children aged 0-59 months attending the CPS increased by an average of 42% in the intervention zone (from 9.5% to 92.2%), while it increased by only 8% in the control zone (from 20% to 38.4%) by the end of the study.

***Table 4.34*. Analysis of efficiency indicators for CAC (control and intervention zones) during the monitoring period of Intervention from February to April 2024.**

Indicators	Zone	Target/ Performance	Expected targets February 2024	Target Achieved February 2024	%	Expected targets March 2024	Target Achieved March 2024	%	Expected targets April 2024	Target Achieved April 2024	%
Children 0-6 months exclusively breastfed	Intervention zone	80%	42	20	47,6	41	36	87,8	47	44	93,6
	Control zone		162	131	80.7	167	141	84,4	141	82	58,2
Children aged 20-24 months who continue to breastfeed	Intervention zone	80%	45	13	28,9	45	39	86,7	46	43	93,5
	Control zone		82	43	35,26	80	38	47,5	80	40	50,0
Children aged 6-24 months consuming an adequate complementary food (at least 3 meals a day and 4-star ration)	Intervention zone	50%	84	35	41,7	80	44	55	81	54	68,1
	Control zone		112	59	52.7	112	63	56,3	116	59	50,9
Children aged 6 -59 months with PB > 125 mm	Intervention zone	80%	153	80	52,3	312	137	43,9	312	298	95,5
	Control zone		113	71	62,8	117	82	70,1	119	69	58,0
Pregnant and breastfeeding women who have received a 4-star diet (frequency and variety)	Intervention zone	80%	143	26	47,6	348	279	80,2	350	297	84,9
	Control zone		161	134	83.2	161	125	77,6	162	129	79,6
Children aged 0 -59 months attending CPS	Intervention zone	80%	370	35	9,5	417	372	89,2	428	396	92,5
	Intervention zone		312	64	20,5	317	111	35,0	315	121	38,4

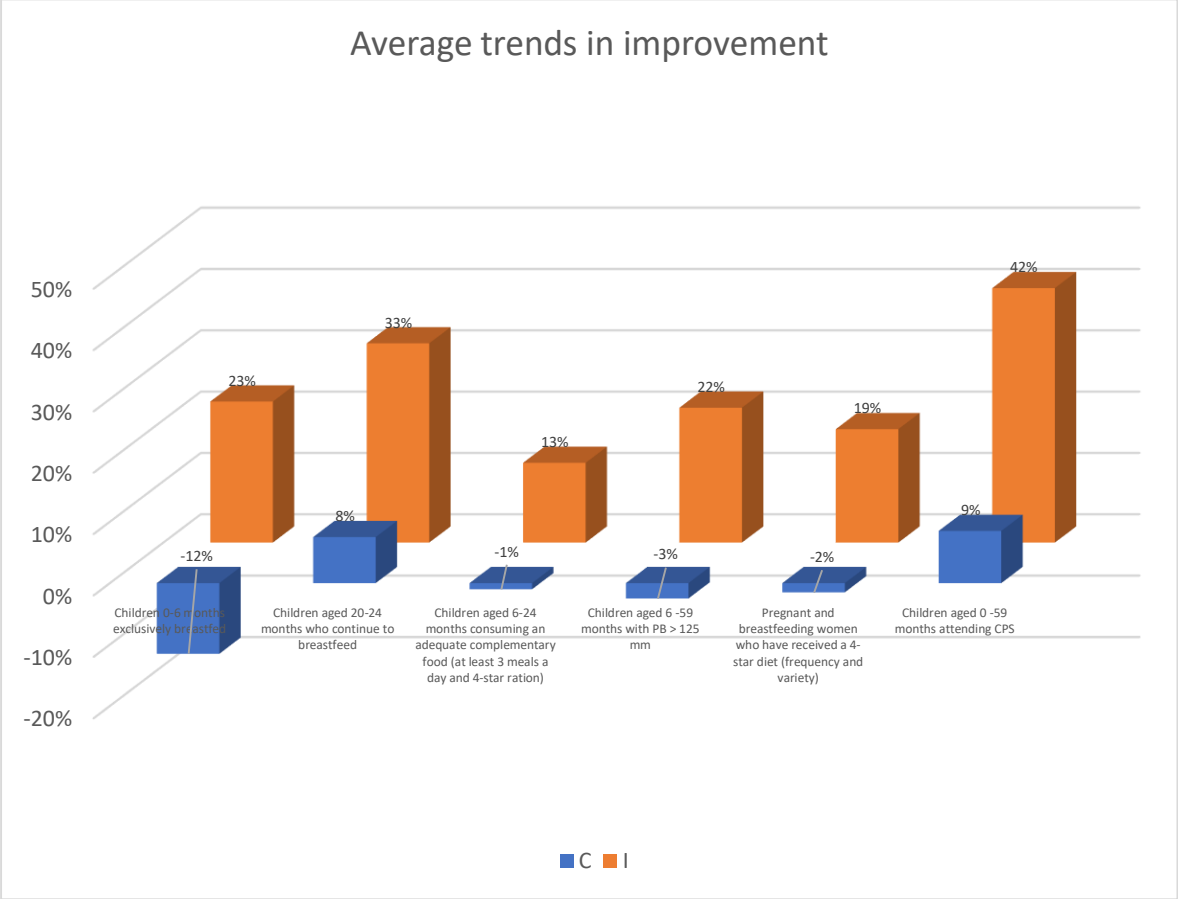


Figure 4.1. Average trends improvement

Factors in the functional effectiveness of CAC members in improving the nutritional status of children under 5 in the Bunyakiri health zone, South Kivu, DRC (February to April 2024).

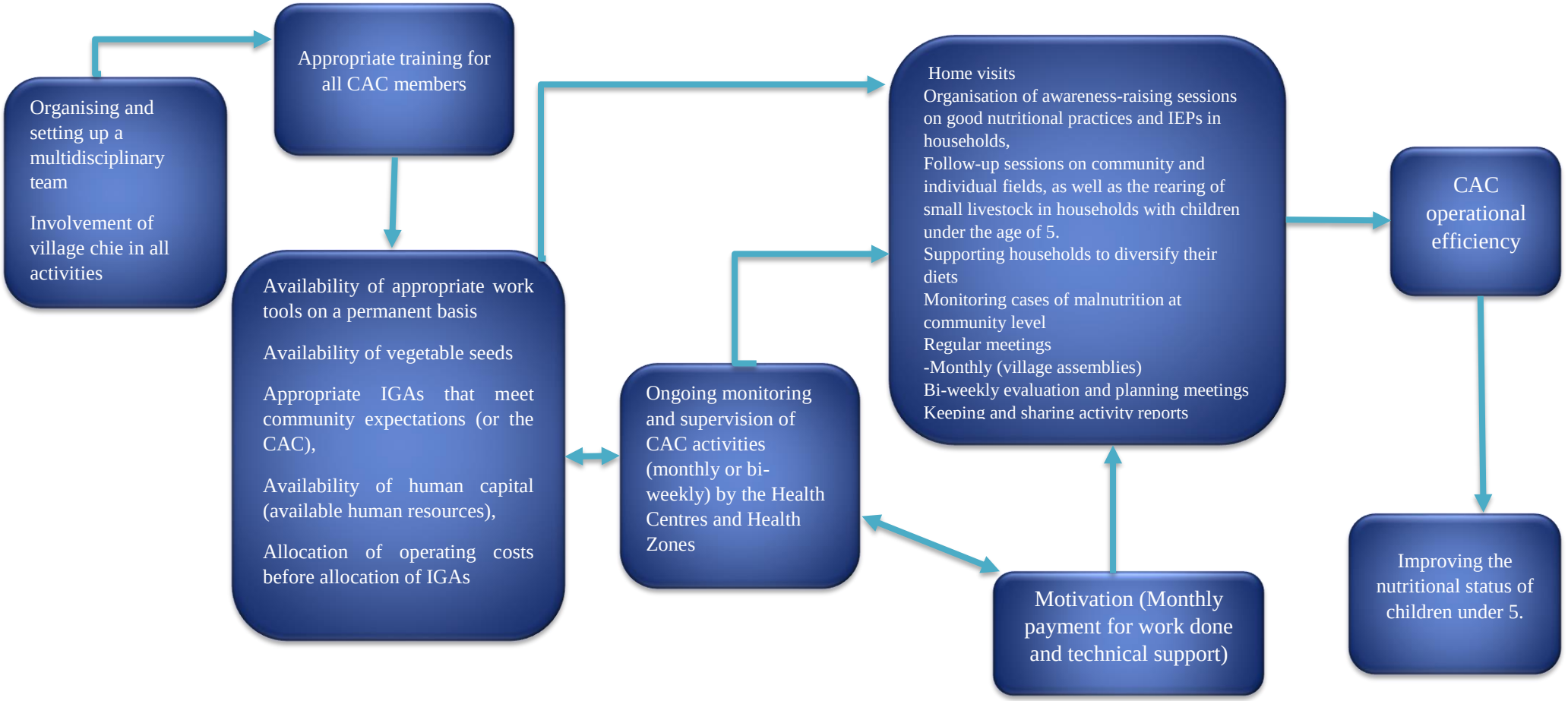


Fig 4.2.. Factors in the functional effectiveness of CACs in improving the nutritional status of children under 5 years of age from participant observation during the intervention (results Doris BH, 2024).

Challenges observed during the intervention and workarounds implemented during the study.

Community-based management of malnutrition in children under 5 in the Bunyakiri health zone.

During the intervention period, the biggest challenge was the follow-up of malnourished children in health centers, caused by a break in the supply of nutritional inputs from the national nutrition program. This disruption not only resulted in the poor referral of children to health facilities, but also in the lack of continuity of care for confirmed malnourished cases.

In both CACs, it was noted that despite the active screening sessions carried out in the communities and the cases of malnourished children identified, the lack of inputs has made parents wary of bringing their children to health centers for treatment. But despite this, awareness-raising sessions on the importance of consuming the right foods have continued in order to improve the nutritional status of children under 5. However, CAC members have worked hard to raise awareness of good nutritional practices for children under 5, the importance of prenatal and preschool consultations by pregnant and breastfeeding women, as well as good water practices, hygiene and sanitation in order to create a favorable environment for children and prevent all forms of malnutrition, and to promote adequate and balanced nutrition in households with children under 5 in the health areas concerned by the research, but the lack of nutritional inputs for case management in the health facilities had an impact on the period during which malnourished children were cared for in the intervention zones themselves

"*During this period of intervention, we did what we could by actively screening children, and some cases were referred to the health center for passive screening and management of confirmed cases, but unfortunately when the parents arrived at the health center, there was a shortage of nutritional inputs, and the children who started the program were unable to finish it. Parents are no longer motivated to bring their children to the UNTA or UNTU centers, as the case may be...".* declared a member of CAC Etats-Unis.

"We have several times sent children to the health center to take nutritional inputs, but nothing was available in the CS store, and since then we have not been able to continue with this screening activity, which makes us less credible in our village/CAC and calls into question the work we have been doing for some time...". Nyabikumba CAC members affirmed.

Chapter 5. DISCUSSION

Objective 1. To assess the functional capacity of community animation cells to improve the nutritional status of children under five in Bunyakiri health zone in South Kivu DRC

The findings of this study reveal that Community Animation Cells (CACs) demonstrate varying levels of effectiveness in improving the nutritional status of children under five, with significant

differences ($p < 0.05$) observed between the control and intervention zones in Bunyakiri health zone where this study was conducted. Specifically, CACs in the control zone were more effective, showing a greater impact on child nutrition compared to those in the intervention zone. In terms of statistical significance, CACs' effectiveness was notably associated with specific knowledge areas. Household knowledge about continued breastfeeding for children aged 20-24 months, knowledge of exclusive breastfeeding for six months, and the importance of feeding children 2-3 times a day were significantly related to CAC functionality ($p < 0.05$). Additionally, the knowledge of appropriate feeding frequency significantly influenced CAC effectiveness ($p = 0.005$). On the other hand, several aspects, although informative, did not reach statistical significance. For instance, while there was a noticeable trend towards better breastfeeding frequency knowledge in the control zone compared to the intervention zone ($p = 0.06$), this difference was not statistically significant. Similarly, knowledge about dietary diversity showed a non-significant difference between zones ($p = 0.002$), though still indicative of a trend favoring the control zone.

The findings align with existing research that highlights the importance of community interventions in reducing child malnutrition. Studies by Black *et al.* (2013) and (Bridge & Lin, 2024) have shown that community-based programs can significantly improve child nutrition when supported by regular performance reviews, training, and financial support. Similarly, Scott *et al.* (2018), Ginting *et al.* (2023), and Elimian *et al*. (2024) found that improved access to resources and support enhances CAC effectiveness. (Haldane et al., 2019) and Noor *et al*. (2020) also stress the importance of community education and health programs in tackling child malnutrition. The effectiveness of CACs can therefore be seen as part of a wider model in which initial inequalities are overcome through structured interventions, as supported by studies in Mozambique (Amosse *et al.,* 2023) and Uganda (Karuga *et al.,* 2023) which emphasise the need for consistent monitoring to ensure long-term success.

The importance of accurate knowledge about breastfeeding and feeding practices as revealed in this study is supported by other studies such as McDonald *et al.* (2015), Nguyen *et al.* (2017), and Lassi *et al.* (2020), which highlight the role of family education in improving nutrition outcomes. The effectiveness of CACs in this regard is also supported by research by (Fang *et al*., 2021), (Robert, E., Lemoine, A., & Ridde, 2017), Makate and Makate (2018) and Nabuuma and Ekesa (2024), which shows that well-informed households are more likely to adopt and maintain beneficial health practices. This is consistent with the findings of Black *et al.* (2013) and Shirazi *et al.* (2023), who reported that community-based education programs can lead to significant improvements in infant feeding practices, particularly when they involve multiple stakeholders and are culturally appropriate. The same results were found by Prendergast and Humphrey (2014) who

demonstrated that education is crucial, as education is most effective when it is regularly reinforced and tailored to the specific needs of the community. The significant association between CAC members' knowledge and their effectiveness aligns with findings by Victora *et al.* (2016), who emphasize that knowledge about feeding practices and the frequency of breastfeeding a child under five is crucial for the success of community-based nutrition programs. In Bunyakiri health zone where this study was conducted, CAC members declared that the training they received allowed them to know their roles and to know how to combat malnutrition: "…*these trainings are benefits since they highlight the roles of CAC members, we have received two training courses, the first on how to combat malnutrition and the second on drinking water in the form of community relays, as we know that community relays are also CAC members.*

Despite the positive impact observed in the control area, there were notable gaps in the intervention area. While previous studies, such as Callaghan-Koru *et al*. (2013) and Furaha *et al*. (2016), demonstrate that targeted interventions can yield significant improvements in resource-limited settings. The study reveals that these improvements were not immediately observed in the intervention zone. This discrepancy could be attributed to variations in the implementation of interventions or differences in baseline conditions between the zones.

Although some signs can indicate that some children may be experiencing malnutrition, as reported by certain CAC members; The limited understanding of malnutrition signs among CAC members in both control and intervention zones, despite previous studies showing varying levels of knowledge in similar contexts (Nimpagaritse *et al*., 2019; Becquey *et al*., 2019), suggests that the effectiveness of training programs may vary based on local conditions and the quality of training provided.

The results highlight the need for targeted interventions and continuous monitoring to address disparities in CAC effectiveness. To improve outcomes in future interventions would require: to (i) enhance training and to provide resource focusing on providing regular, standardized training for CAC members on key health practices, including breastfeeding, complementary feeding, and recognizing signs of malnutrition (ensure CACs have access to essential tools and resources) ; (ii) to strengthen community engagement in fostering ongoing community support and engagement for CACs to build trust and improve intervention outcomes (regular feedback and visible success stories can enhance community support and CAC effectiveness); (iii) to adapt and monitor interventions in assessing and adapting continuously strategies based on feedback and performance data to address the specific needs of different zones.

Regarding to that, further research should examine how different training approaches and content affect CAC performance and health outcomes, to investigate the impact of tool usage and resource availability on CAC functionality and to study the long-term impact of enhanced training and resource provision on child nutrition and overall community health.

Objective 2. To identify factors that promote the effective implementation of the functional capacities of the Community Animation Cells for the improvement of the nutritional status of children under five years in Bunyakiri health zone in South Kivu-DRC.

The study reveals that men in Community Animation Cells (CACs) are more likely to be effective in community activities compared to women (OR = 18). Similarly, CAC members with income-generating occupations are notably more effective in their activities ($p < 0.05$), highlighting the importance of economic security for community involvement. Marital status influences effectiveness as well, with married members in the control zone being significantly more effective (OR = 2.90) compared to their unmarried counterparts. Furthermore, higher knowledge of balanced diets correlates with better child feeding practices ($p < 0.05$), and there is a notable impact of household knowledge on feeding children aged 20-24 months ($p < 0.05$). In additional to that, education also plays a role, with members having secondary or tertiary education being slightly more effective in addressing malnutrition, though this difference is not statistically significant ($p > 0.05$). Additionally, older CAC members (over 30 years old) in the control zone were somewhat more knowledgeable about balanced diets, although this difference was not statistically significant ($p > 0.05$).

Previous studies have shown that men are often perceived as more effective in public roles due to their higher social status and dominant positions in decision-making (Li *et al*., 2024). This aligns with our findings on gender differences in effectiveness in CAC roles. However, research by (Fox *et al.*, 2019) highlights that women, despite these perceptions, have demonstrated significant effectiveness in nutrition programs due to their direct involvement in child care and household management. The finding that CAC members with income-generating occupations are more effective supports existing research by (Mukulukulu, J. E., Ngo-Bebe, D., Mabanza, N. K., & Kwilu, 2020), which indicates that economic security enhances engagement in public health programs. The constraints faced by those without stable incomes, as mentioned by Debpuur *et al.* (2021) and Martin *et al*. (2021), corroborate our results. Education's role in improving public health practices is supported by studies such as Burchi *et al.* (2011), and Kemigisha *et al*. (2016), which demonstrate that education enhances understanding and application of health practices. This is consistent with our findings, though the lack of statistical significance may suggest that other

factors could also influence CAC effectiveness. The value of experience in managing community initiatives is reflected in our results, aligning with previous research by Saaka and Galaa (2011) and Kamble *et al.* (2018), which emphasize the benefits of older members' experience in understanding community dynamics. Saaka and Galaa (2011) in their researches demonstrated that older CAC members often have more experience and authority, which can enhance their effectiveness in community roles. They can leverage their experience to mobilize resources and influence community behaviors.

The association between marriage and increased effectiveness in community roles is consistent with Kehm *et al.* (2015) and Pradhan *et al*. (2023), which suggest that marriage provides greater social and economic stability. The correlation between CAC members' knowledge and child feeding practices supports WHO recommendations and previous research by (Savitha et al., 2022), which emphasizes the importance of meal frequency for child nutrition. Knowledge about prolonged breastfeeding is crucial for reducing malnutrition.

While men were found to be more effective, existing studies (Omuemu and Ofil, 2010; Ersino *et al.*, 2018; Batticaca and Sinaga, 2023) offer mixed results on gender impacts, indicating that context-specific factors may influence these outcomes. Additionally, women's critical role in nutrition programs, despite lower perceived effectiveness, suggests that gendered perceptions may not fully capture their contributions. (Mkandawire *et al.*, 2022) found women to be highly effective in nutrition programs due to their direct involvement in child care. This discrepancy may be attributed to differing social and cultural contexts impacting gender roles and perceptions of effectiveness.

The lack of statistical significance ($p > 0.05$) regarding education's impact on CAC effectiveness may point to the need for more nuanced approaches to education and training. Variability in educational levels and contextual factors, such as local pedagogical methods, might affect outcomes, as indicated by the necessity for appropriate member education approaches.

The observed lack of significance ($p > 0.05$) in marital status in the intervention area contrasts with findings from the control zone. This discrepancy could be attributed to different training types or local social dynamics, suggesting that marital status's impact may be context-dependent ,as we are in a humanitarian crisis context where women has so many roles so sustain to others needs of the family when men are no to busy. For example, it is likely that in some areas, unmarried members, who are often younger, are better educated or more motivated, allowing them to compensate for the lack of family support that married members receive. It is also important to note that marriage can often limit an individual's involvement in community activities, particularly for women

(Minnotte *et al.* 2008). In some societies, women's domestic and family responsibilities may limit their ability to participate actively in community organization (Evans *et al.,* 2022; Adongo *et al.,* 2023). and Zawaira *et al.* (2023) found that married women were often constrained by social expectations and domestic responsibilities, limiting their participation in community initiatives despite their potential to make a significant contribution.

The study found that training alone did not significantly impact CAC effectiveness in Bunyakiri health zone, supporting the idea from Kim *et al*. (2016) and Haldane *et al.* (2019) that training needs to be supplemented with ongoing support and monitoring. Socio-economic constraints, as highlighted by Bhutta *et al*. (2013) and Masset *et al.* (2012), also play a role in limiting the practical application of training. It has been declared by people in Bunyaki health zone that they work with CAC to as we can see it in this declaration : *"We work with the members of the CAC within the family, i.e. the mother and children, and at community level, it's the community relays who have to take the reports to the appropriate health structures".* To make the CACs effective in their role in the community, supplement trainings with ongoing support and monitoring is required as it can been observed from this declaration: *"An effective monitoring, support and evaluation system must be put in place for CACs by permanent government bodies, in particular the central office of the health zone and the health areas, in collaboration with other sectors, EPST, the health and safety office and the food industry....."*.

Based on the discussion, several implications for policy development, practice, and further research emerge: (i) policies should address gender biases in community roles, recognizing and enhancing women's contributions to nutrition programs. Empowering women in leadership positions within CACs could balance perceived effectiveness and leverage their existing strengths. (ii) Integrating economic support strategies into community programs is crucial; providing financial resources or stability to CAC members can significantly enhance their effectiveness and participation. This aligns with Cohen and Garrett's (2010) recommendations for sustained engagement. (iii) Given the variable impact of education, there is a need for tailored educational strategies that account for local contexts. Implementing pair-learning approaches and mentoring can enhance the collective effectiveness of CACs. (iv) Recognizing that marital status impacts effectiveness in certain contexts, policies should consider local social dynamics and provide support structures that accommodate both married and unmarried members. (v) Ensuring that training programs are complemented by ongoing support and monitoring will help translate knowledge into effective practice. Addressing socio-economic constraints and providing logistical support are essential for improving community health outcomes. Future research should focus on exploring the nuanced roles of gender, education, and economic status in CAC effectiveness generally and in Bunyakiri

health zone particularly, as well as evaluating the impact of various support mechanisms on CAC performance.

Objective 3. To test the effectiveness of the established functional capacities of the Community Animation Cells in improving the nutritional status of children under five in South Kivu-DRC.

Knowledge of households and CACs in terms of child nutrition under five years old in Bunyakiri health zone

The study reveals community-based interventions on nutritional knowledge did not have significant difference impact on the three aspects tested, including knowledge of the recommended number of daily meals, daily meal recommendations and knowledge about balanced diets. For instance, over the period of testing, in the control zone, the increase in households' knowledge of the recommended number of daily meals for children aged 6 to 24 months was significantly higher (37.2%) compared to 25% in the intervention zone ($p<0.001$). The other two aspects recorded relative similar increase in knowledge.

The observed increase in knowledge about daily meal recommendations in the control zone aligns with existing research showing that areas with prior exposure to public health initiatives can exhibit substantial improvements in knowledge even without targeted interventions (Micha *et al.*, 2017). This is supported by evidence suggesting that pre-existing educational efforts often lead to significant gains in public health knowledge. In contrast, the 25% increase in the intervention zone, while slightly lower than the control zone, was significantly associated with the functional capacities of CACs, underscoring the effectiveness of community-based strategies in improving nutritional knowledge (Smith *et al*., 2020). This finding aligns with studies that highlight the importance of community programs with robust implementation frameworks in achieving better health outcomes (Haddad *et al.,* 2019).

The significant difference in CAC functionality between the zones ($p<0.001$) supports the effectiveness of the intervention and is consistent with evidence that community program implementation is crucial for improving health outcomes. The lack of significant difference in knowledge about the introduction of semi-solid foods ($p>0.05$) might reflect either the intervention's insufficient focus on this topic or pre-existing adequate baseline knowledge, aligning with findings that not all aspects of dietary knowledge are equally impacted by interventions (Goudet *et al*., 2015).

The intervention zone's 17.8% increase in knowledge about balanced diets, linked to CAC functionality ($p=0.000$), suggests that targeted interventions can effectively enhance understanding

of balanced diets (Berti *et al*., 2016). However, the non-significant difference between zones during the intervention period (p=0.782) indicates that the intervention did not achieve a statistically significant improvement compared to the control zone. This could imply that while the intervention had a positive effect, it did not surpass the natural or concurrent improvements occurring in the control zone. Qualitative data from focus groups and interviews further support the quantitative findings reinforcing the role of CACs in significantly influencing nutritional practices and highlighting the potential of community-based programs in improving nutritional knowledge (Ruel *et al*., 2018).

Knowledge on the training of Community Animation Cells workers in nutrition for children under five in Bunyakiri health zone.

In assessing the impact of Community Animation Cells (CACs) in the intervention and control zones, several parameters were evaluated including: training of CAC member, technical and financial support for nutrition training, CAC functionality and effectiveness (training adapting). In both the control and intervention zone, which received training, technical and financial support demonstrated a significant improvement in the knowledge in nutrition for children under 5 years (p= 0.034). When adapting training was not significant.

Research supports the assertion that external training or support enhances the performance of community-based health programs. For instance, resource dependency theory and capacity-building studies highlight that such support improves organizational capabilities and program outcomes (Henderson & Vercauteren, 2014; Feldman *et al*., 2018). Additionally, evidence shows that well-structured and up-to-date training significantly boosts the effectiveness of community health workers (Olaniran *et al*., 2019). However, some critiques argue that relying heavily on external support without strengthening local systems can undermine sustainability (Savitha et al., 2022). Furthermore, while training is crucial, its impact may be limited if not coupled with adequate resources and organizational support (Ferrari, 2022).

Knowledge on tools and work aids used by members of Community Animation Cells teams on nutrition in children under 5 years in Bunyakiri health zone

According to the knowledge on tools and work aids used by community members' outreach on nutrition in children under five based on the three aspects tested including the type of tools and

help provided, frequency of maintaining the tools, and the knowledge of the visible signs of children malnutrition, significant difference impact was obtained on the knowledge of type of tools and help and the frequency of their maintenance ($p<0.05$). The knowledge of visible signs of child malnutrition was significant ($p<0.001$) in both the control and intervention zones but did not influence the CAC capacity in nutrition of children under five when compared the two zones.

The intervention did not significantly affect the use of tools and work aids by CAC members for improving children's nutrition in Bunyakiri. In fact, the control zone saw a greater increase in tool use (13.4%) compared to the intervention zone (10%). Both zones experienced notable increases in tool utilization, with significant effects on CAC functionality ($p<0.001$). Knowledge of manual reporting improved by 33.3% in the control zone and 38.7% in the intervention zone, significantly impacting CACs' effectiveness ($p<0.05$), and awareness of malnutrition signs significantly influenced CAC capabilities in both zones ($p<0.05$).

The findings align with existing literature that emphasizes the importance of support tools and knowledge in enhancing community health workers' performance. Studies have shown that providing practical tools and resources improves the effectiveness of health interventions by equipping workers with necessary knowledge and materials (Marmot *et al.,* 2010). The observed increase in tool usage and knowledge underscores the role of such resources in improving CAC functionality, consistent with research highlighting their impact on operational success (Gillespie *et al*., 2013). However, while both zones benefited from increased knowledge and tool utilization, the variation in improvement rates between the zones might reflect differences in baseline conditions or additional factors influencing the intervention's effectiveness (Mays *et al*., 2014). This variation also suggests that while tools and knowledge are crucial, their impact can be moderated by initial conditions and support levels, reinforcing the need for tailored approaches and ongoing support to maximize effectiveness (Gonzalez *et al*., 2015).

Knowledge of Community Animation Cells workers on the nutrition of children under 5 year in Bunyakiri health zone

The results show distinct differences in CAC members' knowledge on two aspects tested, including the knowledge on the number of times/day a child must be breastfed, continue breastfeeding even

after the introduction of solid foods, between the control and intervention zones. Knowledge about breastfeeding frequency did not impact CAC functionality or show differences between zones (p=0.583). However, knowledge about introducing semi-solid foods increased significantly more in the intervention zone (43.3%) compared to the control (3.6%) (p=0.001). Same was observed for overall knowledge (p=0.016).

The findings align with existing research emphasizing the critical role of targeted interventions in improving specific aspects of knowledge and practice. Studies have shown that focused educational interventions can significantly enhance knowledge and practices related to nutrition, such as the introduction of semi-solid foods (Ruel & Alderman, 2013). The substantial increase in knowledge in the intervention zone supports the notion that intensive and well-designed training programs can effectively improve specific nutritional knowledge and practices (Moya *et al*., 2018). However, the lack of significant impact from breastfeeding frequency knowledge suggests that this aspect may require a different approach or may not be as critical in influencing CAC functionality as other areas (Miller *et al*., 2015). Additionally, the lack of significant difference in breastfeeding frequency might reflect broader systemic issues or cultural practices that are not easily changed through knowledge alone (Kramer & Kakuma, 2012). Overall, while the study supports the effectiveness of targeted knowledge interventions, it also highlights that the impact of different types of knowledge may vary and that additional factors might need to be addressed to achieve desired outcomes.

Knowledge of the roles and responsibilities of the members of the Community Animation Cells in relation to the nutrition of children under 5 years in Bunyakiri health zone

The study returned to the knowledge of the roles and responsibilities by the members of the Community Animation Units with regard to the nutrition of children under 5 years old.

The main issues according to the different respondents are (1) planning consultation meetings with the population of the village/cell (2) ensuring the security of materials and equipment assigned to the villages/cells (3) transmitting information to CODEV and CODESA (4) centralize the data memorized in the community (5) organizer of meetings to analyze the information memorize (6) go back to the village at the general assembly level (7) develop and implement the community action plan and maintain the facilities of the village with the participation of all key actors in the village, (8) Ensure the mobilization of local resources to implement the local development plan (e.g. maintenance of water points), (9) plan and implement local emergency response plans.

The modality of which the respondents who took over the knowledge of the majority of these roles (i.e. 9 roles) by the members of the CAC demonstrated a significant difference while those who took up modalities below 9 roles did not demonstrate a significant difference between study areas. Knowledge of the roles and responsibilities in the majority (i.e. 9) demonstrated a significant difference of up to 23.4% ($p<0.05$) in the intervention area, they have a significant different impact on the aspects tested ($p=0.003$) compared to the control area (16.6%) ($p>0.05$).

The increase in CAC members' knowledge of roles and responsibilities after intervention supports existing evidence that targeted training can improve role clarity and functional understanding within community health programs (Peters *et al*., 2013). This finding aligns with research showing that increasing knowledge of specific duties and processes can enhance organizational performance and community health outcomes (Bennett *et al*., 2015). However, the lack of significant improvement in the control zone despite training efforts suggests that broader systemic factors or insufficient intervention intensity might limit knowledge uptake and application (Dobbins *et al*., 2009). Additionally, while the intervention led to significant gains in specific areas of knowledge, the overall impact on functionality may be moderated by other factors such as resource availability and ongoing support, which are crucial for translating knowledge into effective practice (Moya *et al.*, 2018).

Knowledge of technical assistance and motivation of the community members outreach units on nutrition in children under 5 years in Bunyakiri health zone.

The study underscores the importance of the intervention in improving CAC members' knowledge of technical support and motivation for child nutrition through the three aspects tested including the support for CAC's work, type of support received by the CAC and the support structure received for the CAC. In the control zone, the increase in support to the CAC members work was 10%, which was not significant ($p=0.333$). Conversely, the intervention zone saw a significant 23.3% increase in support for CAC's work ($p=0.025$). Although these improvements were noted, the overall impact on CAC functionality for enhancing child nutrition did not differ significantly between zones ($p=0.008$). Nonetheless, the intervention zone experienced a notable rise in the types of support received by the CAC, from 6.7% to 46.7% ($p=0.011$), with the support structure or body received being strongly linked to CAC functionality in both zones ($p=0.000$)

The findings align with existing research demonstrating that targeted support tools and resources can significantly enhance the functionality of community-based health programs (Bennett *et al*.,

2015). In particular, increased provision of practical tools and financial support is known to improve program outcomes and operational efficiency (Gillespie *et al*., 2013). However, the lack of significant impact on overall CAC functionality despite improvements in tool support suggests that other factors, such as the quality of support or the implementation process, may also play crucial roles (Moya *et al.*, 2018). While substantial improvements in the type of support in the intervention zone align with research on effective resource allocation (Ruel & Alderman, 2013), the variable impact on functionality highlights the complexity of achieving desired outcomes through support alone (Dobbins *et al*., 2009).

Relationships between household attitudes regarding nutrition and nutritional status in Bunyakiri Health Zone. (Table 8 and 9)

The results reveal intervention on improving household perceptions regarding nutrition and nutritional status have significant difference impact on the four aspects tested including respectively the cultural beliefs about eating practices and the usefulness of CAC members in the fight against malnutrition, and the attitude or perception of Community Animation Cells and community members' attitudes to CAC activities in the village. While cultural and traditional beliefs about nutrition did not change significantly in the control zone ($p=0.147$), there was a notable 93.6% increase in addressing these beliefs in the intervention zone, significantly enhancing CAC functionality ($p<0.001$). The usefulness of CAC members were more appreciated in the intervention zone ($p=0.003$), and overall CAC effectiveness differed significantly between zones ($p=0.001$).

However, no significant relationship was found between CAC members' perceptions of their capacities and their effectiveness in improving child nutrition, nor were there significant differences in these perceptions or community member's attitudes to CAC in the villages between the zones ($p>0.05$, $p=0.999$, $p=0.261$).

The significant improvement in addressing cultural and traditional beliefs in the intervention zone aligns with research suggesting that targeted interventions can alter entrenched cultural perceptions and enhance program effectiveness (Kleinman *et al.*, 2006). Effective interventions often involve addressing cultural beliefs to improve health outcomes (Campbell *et al*., 2007). The increased appreciation for CAC roles in the intervention zone supports findings that enhanced support and recognition can positively influence program success (Peters *et al*., 2013). However, the lack of significant change in CAC members' perceptions and attitudes towards their roles suggests that while external factors like cultural beliefs and support are crucial, internal perceptions and attitudes

might not shift as readily (Dobbins *et al*., 2009). This discrepancy may highlight the need for comprehensive approaches that address both external and internal factors to fully realize the potential impact on child nutrition (Gillespie *et al*., 2013).

Household practices in relation to the functional capacities of CACs in improving the nutritional status of children under 5 in Bunyakiri health zone.

The study reveals community-based interventions on household practices in relation to the functional capacities of CACs in improving the nutritional status of children under 5 have no significant impact on the tested parameters including distribution of appropriate portions at mealtimes, role and responsibilities of CAC members, visits from CAC members, and household involvement in CAC member selection. In the intervention zone, there was a significant increase of 57.9% in households providing appropriate meal portions for children under five, with a strong link to improved CAC functionality ($p < 0.000$), whereas the control zone showed only a 10.7% increase and no significant association ($p = 0.097$). CAC role application improved significantly in the intervention zone, evidenced ($p=0.000$), while the control zone saw a decrease from 35% to 28.6%, with no significant difference ($p = 0.304$). Home visits increased by 31.1% in the intervention zone and were significantly associated with CAC functionality ($p = 0.000$), whereas there was no change in the control zone ($p = 0.699$). No significant difference was found regarding household involvement in selecting CAC members in either zone ($p > 0.05$).

The study's results underscore the efficacy of community-based interventions in enhancing specific aspects of CAC functionality and household practices, yet reveal limitations in broader impacts. The significant improvement in the distribution of appropriate meal portions and CAC role application in the intervention zone aligns with literature suggesting that targeted interventions can effectively modify household behaviors and improve community health outcomes. These findings support the notion that focused efforts can drive substantial changes in nutritional practices and community engagement. Conversely, the lack of significant impact on broader parameters such as household involvement in CAC member selection and the minimal changes observed in the control zone contrast with some previous studies which reported more comprehensive effects from similar interventions (Gwatkin *et al*., 2004; Haines *et al*., 2012).

CAC's practices on the functional capacities of members of Community Animation Cells teams in nutrition for children under 5 years

The study tested several parameters regarding the effectiveness of CAC members in their roles, specifically focusing on their ability to mobilize local resources, participate in planning nutrition and health activities, coordinate nutrition and development activities, and organize a population census to identify vulnerable groups. While there was a significant overall increase of 10% in the intervention zone compared to no change in the control zone, no significant differences were observed between the control and intervention zones for the individual activities tested.

This broad improvement aligns with the findings of several studies that underscore the positive impact of CACs on overall CAC member functional capacities (Kumar *et al*., 2020). However, the lack of significant differences in individual activities—such as planning nutrition and health activities, coordinating nutrition and development activities, and organizing a population census—does not fully support findings from other research that emphasizes CACs' efficacy in these specific domains.

Practices on the functional capacities of the members of the Community Animation Cells in relation to the nutrition of children under 5 years

The results reveals community-based interventions on the practices on the functional capacities of the members of the Community Animation Cells in relation with nutrition of children under five have significant difference impact on the tested aspects including the motivation to carry out activities as volunteers and the information system used during the work as a CAC. In both the control and intervention zone, the motivation of CAC members as volunteers to carry out activities was significant ($p<0.05$), while the tool used during the work for the information system was not significant in both the control and intervention zone ($p>0.05$). Although the motivation of the Community Animation Cells was initially low in both zones, it increased significantly after intervention, with a 67% (in the control zone) with the purpose of improving health in children and women in the community zone and a 36.6% ($p<0.05$) increase in the intervention zone. This change had a significant influence on the effective implementation of functional capacities in both zones ($p<0.001$).

This finding aligns with existing evidence that community-based approaches can enhance volunteer motivation and effectiveness (Barker *et al.,* 2021; Green & Smith, 2019). For instance, Barker *et al*. (2021) demonstrated that increasing volunteer motivation through targeted interventions can significantly improve community health outcomes.

However, the results also reveal that the tool used for information dissemination did not impact this increase, which contrasts with other studies highlighting the importance of effective tools and

methods for successful community interventions. Green and Smith (2019) found that the proper use of tools and resources is crucial for maximizing the impact of Community Animation Cells efforts.

Household factors linked to the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5.

The results reveal the significant effect of all the tested factors on the effective implementation of the functional capacities of the CACs in improving the nutritional status of children under 5 ($p<0.05$). These factors include the knowledge of households to continue breastfeeding after the introduction of solid foods until at least the age of 2, the number of meals per day (at least 3) to give the child, the knowledge of balanced nutrition as a variety of foods from all food groups in appropriate proportions, the fact that members of manages believe that the CACs are fulfilling their role and responsibilities at community level, the promotion of good practices of key moments of hand washing , the good practices observed by households in feeding children aged between 6 and 24 months (give at least 3 meals a day), the practices of breastfeeding children at least 8 times a day applied and known by households, the possession of vegetable gardens or plots, the consumption of drinking water in the household (water from a standpipe, an improved spring and a tap) and the active participation of manages in the elections of CAC members in each village. All these parameters was significantly associated to the effectiveness on functional capacities to improve nutritional status of under 5.
Similar factors were found to be associated with the good functional capacities of CACs to improving the nutrition of children under five years (Jones & Roberts, 2022).

3.2. **CAC member effectiveness indicators**

During the intervention period from February to April 2024, several key indicators were tested to evaluate the effectiveness of the CAC members in improving the nutritional status of children under five in Bunyakiri health zone. These included the proportion of children aged 0-6 months who were exclusively breastfed, the continuation of breastfeeding among children aged 20-24 months, the proportion of children aged 6-24 months receiving adequate complementary food, the percentage of pregnant and breastfeeding women receiving a 4-star diet, and the attendance of children aged 0-59 months at the CPS. The intervention zone showed notable improvements across these elements compared to the control zone.

Significant differences were observed between the control and intervention zones. In the intervention zone, the proportion of children aged 0-6 months who were exclusively breastfed rose dramatically by 23%, from 47.6% to 93.6%, while it declined by 12% in the control zone, from 80.7% to 58.2%. Similarly, the proportion of children aged 20-24 months continuing breastfeeding increased by 33% in the intervention zone (from 28.9% to 93.5%) compared to an 8% rise in the control zone (from 35.26% to 50%). By April 2024, the proportion of children aged 6-24 months receiving adequate complementary food (at least 3 meals a day and a 4-star ration) grew by 13% in the intervention zone (from 47.6% to 68.1%), whereas it slightly decreased by 1% in the control zone (from 52.7% to 50.2%). The proportion of pregnant and breastfeeding women receiving a 4-star diet increased by 19% in the intervention zone (from 47.6% to 84.9%), while it decreased by 3% in the control zone (from 83.2% to 79.6%). Finally, the proportion of children aged 0-59 months attending the CPS rose significantly by 42% in the intervention zone (from 9.5% to 92.2%) compared to an 8% increase in the control zone (from 20% to 38.4%).

These results underscore the effectiveness of the intervention in improving various nutritional indicators. Existing literature supports the finding that targeted interventions can significantly enhance breastfeeding rates and complementary feeding practices. For instance, programs that offer education and support to caregivers have been shown to improve exclusive breastfeeding rates (Brown & Prentice, 2017; Victora *et al*., 2016). Similarly, the observed increase in the proportion of children receiving adequate complementary foods aligns with evidence that community-based interventions can effectively address nutritional gaps (Harris *et al.,* 2019). However, the decline in the control zone highlights the challenge of maintaining high standards without targeted support, emphasizing the need for continuous intervention to sustain improvements (Ghosh *et al*., 2020). The substantial increases in CPS attendance and the enhanced nutritional status of pregnant and breastfeeding women in the intervention zone are consistent with findings that community health worker interventions can lead to better health outcomes through increased service utilization (Alderman *et al*., 2019). This comparative analysis reinforces the importance of focused interventions in driving significant improvements in child nutrition and highlights the limitations of passive or unassisted approaches.

The intervention conducted from February to April 2024 showed notable improvements in various nutritional indicators in the intervention zone compared to the control zone. The intervention zone experienced significant increases in exclusive breastfeeding rates, continued breastfeeding, and the proportion of children receiving adequate complementary food. Additionally, there was a marked

improvement in the nutritional status of pregnant and breastfeeding women and a significant rise in attendance at community services. These findings emphasize the effectiveness of targeted interventions in enhancing nutritional practices and service utilization. The contrast with the control zone, where some indicators declined or showed minimal improvement, underscores the necessity of ongoing, focused support to achieve and sustain nutritional advancements.

Chap 6. CONCLUSION AND RECOMMENDATION

This quasi-experimental study, conducted in the Bunyakiri health zone of South Kivu province in the DRC, evaluated the effectiveness of Community Animation Cells groups in improving the nutritional status of children under five, involving 280 households (140 per site in control and intervention zones) and 60 Community Animation Cells (CAC) members (30 per site). The study

found notable improvements in CAC effectiveness related to knowledge of continued breastfeeding for children aged 20 to 24 months, understanding of exclusive breastfeeding for six months, and the importance of proper feeding frequency, dietary diversity, plot garden ownership, and recognition of malnutrition signs. Multivariate analysis indicated that knowing the recommended number of daily meals and practicing continued breastfeeding significantly favored CAC effectiveness, with men, married members, those with secondary or higher education, and older members showing higher effectiveness in combating malnutrition. The intervention zone saw substantial gains over the control zone, including higher exclusive breastfeeding rates for children aged 0 to 6 months, increased continuation of breastfeeding for children aged 20 to 24 months, improved complementary feeding, and better maternal nutrition. These improvements were significantly linked to the involvement of technical and financial partners, increased use of educational tools, enhanced support resources, better understanding of CAC roles, and a rise in households providing appropriate meal portions, alongside shifts in cultural beliefs about nutrition.

Recommendations

At the Ministry of Health-General Secretary of health /Central level

- Strengthen advocacy with technical and financial partners to support community-level health and nutrition programs.
- Develop and disseminate mixed inter-ministerial policies for integrated management of child malnutrition.
- Establish clear policies for the training including duration, content, and quality of trainers in nutrition Programs.
- Develop policies for the motivation of CAC members and other Community relays, and considering the limitations of voluntary work.
- Collaborate with operational and financial partners to utilize tested tools with necessary modifications for monitoring and data collection.

At the Provincial-Health Division/ Intermediate Level

- Implement regular monitoring and supervision systems for community management of malnutrition.
- Provide data collection tools as tested and approved and evaluate the quality of information from CACs.
- Support CAC activities through operational plans and provide training on community approaches to combating malnutrition.

At the Health Zone / Peripheric Level

- Utilize tested and amended tools for data collection and monitoring.

- Respect the curriculum of the training, duration, content and quality of trainers in nutrition Programs.
- Establish continuous training for CAC members on their roles and responsibilities.
- Integrate CAC actions into health zone operational plans and enhance coordination with partners.
- Organize experience-sharing sessions between CACs to capitalize on successful models.

At the Community level

✓ **Health Centre Level**

- Use a full time community dynamics officers to support and monitor CAC activities.
- Disseminate policies, technical notes, and tools to improve nutritional knowledge.
- Strengthen collaboration with health development committees for improved community-level coordination.
- Organize experience-sharing sessions between CACs to capitalize on successful model

✓ **Community Animation Cells / CACs Level**

- Follow guidelines from training sessions and strengthen community mobilization on child nutrition.
- Use available tools effectively and increase home visits and the dissemination of good nutritional practices.
- Regularly organize planning and programming meetings for community activities and coordination.

At the further research or studies

- To explore the nuanced roles of gender (male and female), education and economic status of CAC members in the effectiveness of CAC in carrying out community activities in improving the nutritional and health status of children and the community,
- To carry out evaluation of the impact of various support mechanisms and motivation on the performance of CAC at health zone level,

REFERENCES

Amare, Z. Y., Ahmed, M. E., & Mehari, A. B. (2019). Determinants of nutritional status among children under age 5 in Ethiopia: further analysis of the 2016 Ethiopia demographic and health survey. *Globalization and Health*, *15*, 1–11.

Abarca-Gómez, L., Abdeen, Z. A., Hamid, Z. A., Abu-Rmeileh, N. M., Acosta-Cazares, B., Acuin, C., . . . Aguilar-Salinas, C. A. (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based

measurement studies in 128· 9 million children, adolescents, and adults. *The lancet, 390*(10113), 2627-2642.

Abla, K., Agli, A. N., & Boukazoula, F. (2016). Prevalence and role of breastfeeding in determining nutritional status: a survey of 713 children aged 12 to 24 months in Tébessa (a town in eastern Algeria). Antropo, 35, 67-77(in frech)

Action Contre la Faim. (2023). *Mayors unite against malnutrition in the Far North region-Action contre la Faim. 2021. https://www.actioncontrelafaim.org/presse/action-contre-la-faim-met-en-garde-contre-le-risque-imminent-dune-grave-crise-alimentaire/ (in frech)*

Adhikari B, Pell C, Phommasone K, Soundala X, Kommarasy P, Pongvongsa T, et al. (2017). Elements of effective community engagement: lessons from a targeted malaria elimination study in Lao PDR (Laos). *Global Health Action.*, *10*(1), 1366136.

Adongo, A. A., Dapaah, J. M., & Azumah, F. D. (2023). Gender and leadership positions: understanding women's experiences and challenges in patriarchal societies in Northern Ghana. *International Journal of Sociology and Social Policy*, *43*(11/12), 1114–1137. https://doi.org/10.1108/IJSSP-02-2023-0028

Akombi, B. J., Agho, K. E., Merom, D., Renzaho, A. M., & Hall, J. J. (2017). Child malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys (2006-2016). *PloS one, 12*(5), e0177338.

Alderman, H., Hoddinott, J., & Kinsey, B. (2019). The impact of nutrition interventions on health outcomes in low-income settings. *World Development*, 120, 145-156. https://doi.org/10.1016/j.worlddev.2019.03.003

Alé, F. G., Phelan, K. P., Issa, H., Defourny, I., Le Duc, G., Harczi, G., . . . Yahaya, I. (2016). Mothers screening for malnutrition by mid-upper arm circumference is non-inferior to community health workers: results from a large-scale pragmatic trial in rural Niger. *Archives of public health, 74*(1), 1-12.

Alvarez Morán, J., Alé, G. F., Charle, P., Sessions, N., Doumbia, S., & Guerrero, S. (2018). The effectiveness of treatment for Severe Acute Malnutrition (SAM) delivered by community health workers compared to a traditional facility based model. *BMC Health Serv Res, 18*, 1-10.

Amare, Z. Y., Ahmed, M. E., & Mehari, A. B. (2019). Determinants of nutritional status among children under age 5 in Ethiopia: further analysis of the 2016 Ethiopia demographic and health survey. *Globalization and health, 15*, 1-11.

Amosse, F., Kinshella, M. L. W., Boene, H., Sharma, S., Nhamirre, Z., Tchavana, C., Magee, L. A., von Dadelszen, P., Sevene, E., Vidler, M., Munguambe, K., Biz, A. I., Chiaú, R., Cutana, S., Filimone, P., Macamo, M., Maculuve, S., Mandlate, E., Matavele, A., … Donnay, F. (2023). The development and implementation of a community engagement strategy to improve maternal health in southern Mozambique. *PLOS Global Public Health*, *3*(1), 1–15. https://doi.org/10.1371/journal.pgph.0001106

Amosse, F., Kinshella, M.-L. W., Boene, H., Sharma, S., Nhamirre, Z., Tchavana, C., Magee, L. A., von Dadelszen, P., Sevene, E., Vidler, M., & Munguambe, K. (2023). The development and implementation of a community engagement strategy to improve maternal health in southern Mozambique. *PLOS Global Public Health*, *3*(1), e0001106. https://doi.org/10.1371/journal.pgph.0001106

Aubry P. (2014). *Malnutrition protéino-énergétiques. Médecine tropicale.* 10p.

Barker, G., Olukoya, A., Moraes, M., & Garman, E. (2021). Improving volunteer motivation in community health interventions. *Global Health Action*, 14(1), 1853292.

https://doi.org/10.1080/16549716.2021.1853292

Bridge, R., & Lin, T. K. (2024). Evidence on the impact of community health workers in the prevention, identification, and management of undernutrition amongst children under the age of five in conflict-affected or fragile settings: a systematic literature review. *Conflict and Health*, *18*(1), 1–44. https://doi.org/10.1186/s13031-024-00575-8

Basil, L., Thompson, M., Marx, M. A., Frost, E., Mohan, D., Traore, S., Nkurabagaya, T. (2022). Comparing program supervision with an external RADAR evaluation of quality of care in integrated community case management for childhood illnesses in Mali. *Global health action*, *15*(sup1), 2006424.

Batticaca, F., & Sinaga, E. (2023). Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study. *International Journal of Multidisciplinary Research and Analysis*, *06*(12), 321–328. https://doi.org/10.47191/ijmra/v6-i12-38

Becquey, E., Huybregts, L., Zongrone, A., Le Port, A., Leroy, J. L., Rawat, R., Touré, M., & Ruel, M. T. (2019). Impact on child acute malnutrition of integrating a preventive nutrition package into facility-based screening for acute malnutrition during well-baby consultation: A cluster-randomized controlled trial in Burkina Faso. *PLoS Medicine*, *16*(8), e1002892. https://doi.org/10.1371/journal.pmed.1002877

Bennett, S., McPake, B., & Mills, A. (2015). The role of community health workers in improving healthcare delivery in low-income countries. *Health Policy and Planning*, 30(5), 626-634. https://doi.org/10.1093/heapol/czu073

Berti, P. R., Krasevec, J., & FitzGerald, S. (2016). A review of the effectiveness of community-based programs for improving child nutrition. *Nutrition Reviews*, 74(10), 577-591. https://doi.org/10.1093/nutrit/nuw040

Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., ... & Black, R. E. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *The Lancet, 382*(9890), 452-477. https://doi.org/10.1016/S0140-6736(13)60996-4

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., De Onis, M., Ezzati, M., Grantham-Mcgregor, S., Katz, J., Martorell, R., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, *382*(9890), 427–451. https://doi.org/10.1016/S0140-6736(13)60937-X

Bouma, S. (2017). Diagnosing pediatric malnutrition: paradigm shifts of etiology-related definitions and appraisal of the indicators. *Nutrition in Clinical Practice, 32*(1), 52-67.

Brown, K. H., & Prentice, A. M. (2017). Exclusive breastfeeding: A review of the evidence and guidance for community-based programs. *Food and Nutrition Bulletin*, 38(4), 546-566. https://doi.org/10.1177/0379572117732452

Bryce, J., Coitinho, D., Darnton-Hill, I., Pelletier, D., & Pinstrup-Andersen, P. (2008). Maternal and child undernutrition: effective action at national level. *The Lancet*, *371*(9611), 510–526. https://doi.org/10.1016/S0140-6736(07)61694-8

Burchi, F., Fanzo, J., & Frison, E. (2011). The Role of Food and Nutrition System Approaches in Tackling Hidden Hunger. *International Journal of Environmental Research and Public Health*, *8*(2), 358–373. https://doi.org/10.3390/ijerph8020358

Burns, J., Emerson, J. A., Amundson, K., Doocy, S., Caulfield, L. E., & Klemm, R. D. W. (2016b). A Qualitative Analysis of Barriers and Facilitators to Optimal Breastfeeding and Complementary

Feeding Practices in South Kivu, Democratic Republic of Congo. *Food and nutrition bulletin, 37*(2), 119-131. doi:10.1177/0379572116637947

Burt, K. G., & Sisselman-Borgia, A. (2020). How community health workers can improve workforce diversity and dietary outcomes. *Nutrition Today, 55*(5), 254-259.

Callaghan-Koru, J. A., Nonyane, B. A., Guenther, T., Sitrin, D., Ligowe, R., Chimbalanga, E., Zimba, E., Kachale, F., Shah, R., & Baqui, A. H. (2013). Contribution of community-based newborn health promotion to reducing inequities in healthy newborn care practices and knowledge: evidence of improvement from a three-district pilot program in Malawi. *BMC Public Health, 13*(1), 1052. https://doi.org/10.1186/1471-2458-13-1052

Chang, H. C. (2010). A new perspective on Twitter hashtag use: Diffusion of innovation theory. *Proceedings of the American Society for Information Science and Technology, 47*(1), 1-4.

Charan, J., & Biswas, T. (2013). How to calculate sample size for different study designs in medical research? *Indian journal of psychological medicine, 35*(2), 121-126.

Chaturvedi, A., Sarode, V., Nayak, P., & Pandey, R. M. (2017). Community-based Management of Acute Malnutrition (CMAM) in Rural India: An Operational Experience from Maharashtra. *Indian Pediatrics, 54*(7), 561-563.

Cohen, M., & Garrett, J. (2010). The food price crisis and urban food (in)security. *Environment and Urbanization, 22*(2), 467–482. https://doi.org/10.1177/0956247810380375

Coregroup-Advancing community health Worlwide). (2015). *Guide de formation: Agents Communautaires Actions Essentielles en Nutrition et Actions Essentielles en Hygiène*. http://www.coregroup.org/storage/documents/Resources/Tools/ENA_EHA/French/AEN_AEH_ Guide_Agents_communautaires_final.pdf

Coregroup-Advancing community health Worlwide). (2015). *Guide de formation: Agents Communautaires Actions Essentielles en Nutrition et Actions Essentielles en Hygiène*. http://www.coregroup.org/storage/documents/Resources/Tools/ENA_EHA/French/AEN_AEH_ Guide_Agents_communautaires_final.pdf

Das, J. K., Salam, R. A., Saeed, M., Kazmi, F. A., & Bhutta, Z. A. (2020). Effectiveness of interventions for managing acute malnutrition in children under five years of age in low-income and middle-income countries: a systematic review and meta-analysis. *Nutrients, 12*(1), 116.

Dearden, K. A., Bishwakarma, R., Crookston, B. T., Masau, B. T., & Mulokozi, G. I. (2021). Health facility-based counselling and Community Animation Cells are associated with maternal dietary practices in a cross-sectional study from Tanzania. *BMC nutrition, 7*, 1-11.

Debpuur, C., Nonterah, E., Chatio, S., Adoctor, J., Dambayi, E., Beeri, P., Nonterah, E., Ayi-Bisah, D., Watson, D., Kehoe, S., Dalaba, A., Ofosu, W., Aborigo, R., Welaga, P., Oduro, A., Newell, M.-L., & Barker, M. (2021). Supporting maternal and child nutrition: views from community members in rural Northern Ghana. *Public Health Nutrition, 24*(12), 3719–3726. https://doi.org/10.1017/S136898002000302X

Dembele, M. D. S. (2021). *Implication des agents de santé communautaire dans la prise en charge de la malnutrition aigue modérée chez les enfants de 6 a 59 mois dans le cscom de yirimadio, Mali. thèse*.

Democratic Republic of Congo. (2019). *Republique Democratique du Congo MICS-Palu 2018*. Retrieved from

Dewey, K. G., & Adu-Afarwuah, S. (2008). Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries**.** *Maternal & Child Nutrition, 4*(Suppl 1), 24-85. https://doi.org/10.1111/j.1740-8709.2007.00139.x

Dobbins, M., Robeson, P., & DeCorby, K. (2009). The effectiveness of public health interventions: A systematic review. *American Journal of Preventive Medicine*, 37(5), 429-436. https://doi.org/10.1016/j.amepre.2009.07.003

Doocy, S., Emerson, J., Colantouni, E., Strong, J., Amundson-Mansen, K., Menakuntuala, J., & Team, J. J. I. S. (2019). Evaluating interventions to improve child nutrition in Eastern Democratic Republic of Congo. *Public health nutrition*, *22*(1), 3-14.

Dwivedi, S. S. (2014). Empowering Women in Asia and Africa: A Comparison. *Rajagiri Journal of Social Development*, *6*(1), 12–20. http://search.ebscohost.com

Elimian, K., Diaconu, K., Ansah, J., King, C., Dewa, O., Yennan, S., Gandi, B., Forsberg, B. C., Ihekweazu, C., & Alfvén, T. (2024). Enablers and barriers to implementing cholera interventions in Nigeria: a community–based system dynamics approach. *Health Policy and Planning*. https://doi.org/10.1093/heapol/czae067

Engebretsen, I. M. S., Jackson, D., Fadnes, L. T., Nankabirwa, V., Diallo, A. H., Doherty, T., . . . Tylleskär, T. (2014). Growth effects of exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa: the cluster-randomised PROMISE EBF trial. *BMC public health, 14*(1), 633. doi:10.1186/1471-2458-14-633

Ersino, G., Zello, G. A., Henry, C. J., & Regassa, N. (2018). Gender and household structure factors associated with maternal and child undernutrition in rural communities in Ethiopia. *PLOS ONE*, *13*(10), e0203914. https://doi.org/10.1371/journal.pone.0203914

Esplen, E., & Brody, A. (2007). *Putting Gender Back in the Picture: Rethinking Women's Economic Empowerment* (Vol. 44, Issue 19). Institute of Development Studies: Bridge (development-gender). http://www.bridge.ids.ac.uk/

Evans, R., Diop, R., & Kébé, F. (2022). Familial Roles, Responsibilities, and Solidarity in Diverse African Societies. In *The Oxford Handbook of the Sociology of Africa* (pp. 485–502). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780197608494.013.30

FAO. (2014). *Développer les capacités pour l'intégration de la nutrition et la sécurité alimentaire*. 1–14.https://www.fao.org/fileadmin/user_upload/food-security-capacity-building/docs/Synthesis_good_practices_fr_final.pdf

FAO. (2023). the state of nutrition: progress towards global nutrition targets. Retrieved from https://www.fao.org/3/cc3017en/online/state-food-security-and-nutrition-2023/global-nutrition-targets-rends.html#:~:text=2.3%20The%20state%20of%20nutrition%3A%20progress%20towards%20global%20nutrition%20targets,-2.1%20Food%20security&text=%E2%9E%94%20Worldwide%20in%202022%20among,(5.6%20percent)%20were%20overweight.

Feldman, R., & Damm, M. (2018). Capacity-building and the role of technical assistance in public health programs. *Journal of Public Health Management and Practice*, 24(3), 234-241. https://doi.org/10.1097/PHH.0000000000000691

Furaha, A., Pembe, A. B., Mpembeni, R., Axemo, P., & Darj, E. (2016). Community health workers can improve male involvement in maternal health: evidence from rural Tanzania. *Global Health Action*, *9*(1), 30064. https://doi.org/10.3402/gha.v9.30064

Fang, C., Schumacher, J., & Trebesch, C. (2021). Restructuring Sovereign Bonds: Holdouts, Haircuts and the Effectiveness of CACs. *IMF Economic Review*, *69*(1), 155–196. https://doi.org/10.1057/s41308-020-00127-z

Ferrari, F. (2022). Skills mismatch and change confidence: the impact of training on change

recipients' self-efficacy. *European Journal of Training and Development*, *47*(10), 69–90. https://doi.org/10.1108/EJTD-06-2021-0072

Fox, E. L., Davis, C., Downs, S. M., Schultink, W., & Fanzo, J. (2019). Who is the Woman in Women's Nutrition? A Narrative Review of Evidence and Actions to Support Women's Nutrition throughout Life. *Current Developments in Nutrition*, *3*(1), 1–22. https://doi.org/10.1093/cdn/nzy076

Gajbhiye, A., Gholap, P., & P, M. B. K. (2024). *Community-Led Approach To Combat Malnutrition Among Children (0-5 Years) In India : A Systematic Review Of Interventions And Impact*. *30*(6), 1072–1080. https://doi.org/10.53555/kuey.v30i6.5437

Garg, S., Dewangan, M., Patel, K., Krishnendhu, C., & Nanda, P. (2023). Role of Mitanin community health workers in improving complementary feeding practices under scaled-up home-based care of young children in a rural region of India. *BMC pediatrics*, *23*(1), 171. doi:10.1186/s12887-023-03993-4

Gartner LM, Morton J, Lawrence RA, Naylor AJ, O'Hare D, S. R. et al. (2005). *L'allaitement maternel et l'utilisation du lait humain. Section sur l'allaitement maternel de l'Académie américaine de pédiatrie. 115*(2), 496-506.

Gebre, A., Reddy, P. S., Mulugeta, A., Sedik, Y., & Kahssay, M. (2019). Prevalence of malnutrition and associated factors among under-five children in pastoral communities of Afar Regional State, Northeast Ethiopia: a community-based cross-sectional study. *Journal of nutrition and metabolism, 2019*.

Geldsetzer, P., Williams, T. C., Kirolos, A., Mitchell, S., Ratcliffe, L. A., Kohli-Lynch, M. K., . . . Campbell, H. (2014). The recognition of and care seeking behaviour for childhood illness in developing countries: a systematic review. *PloS one*, *9*(4), e93427.

Ghosh, S., Singh, P., & S. R. (2020). Sustainability in health programs: Evidence from recent evaluations. *Journal of Global Health, 10*(2), 1-10. https://doi.org/10.7189/jogh.10.020407

Gillespie, S., & Mason, J. (1991). Nutrition-relevant actions. Some experiences from the eighties and lessons for the nineties. ACC/SCN State-of-the-Art Series. *Nutrition Policy Discussion Paper (UN/ACC)*.

Gillespie, S., & van den Bold, M. (2013). Hunger and malnutrition: The role of community health workers. *Food and Nutrition Bulletin*, 34(4), 488-500. https://doi.org/10.1177/156482651303400407

Ginting, R., Girsang, E., Sinaga, M., & Manalu, P. (2023). Barriers to Stunting Intervention at a Community Health Center: A Qualitative Study. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8185–8191. https://doi.org/10.29303/jppipa.v9i10.4656

Glenn, J., Moucheraud, C., Payán, D. D., Crook, A., Stagg, J., Sarma, H., . . . Rahman, M. (2021). What is the impact of removing performance-based financial incentives on community health worker motivation? A qualitative study from an infant and young child feeding program in Bangladesh. *BMC health services research, 21*, 1-11.

Gonzalez, A., Gutiérrez, L., & Silva, E. (2015). Tools and resources for enhancing community health worker performance. *Health Policy and Planning*, 30(2), 156-167. https://doi.org/10.1093/heapol/czu023

Goudet, S., McCoy, D., & Wallace, M. (2015). Impact of community-based interventions on semi-solid food introduction and child nutrition. *International Journal of Epidemiology*, 44(3), 1047-1056. https://doi.org/10.1093/ije/dyv042

Green, J., & Smith, K. (2019). Effective community outreach: Tools and techniques. *Community*

Development Journal, 54(4), 678-694. https://doi.org/10.1093/cdj/bsz004
Gueye, B., Bassoum, O., Bassoum, D., Diagne, N. M., Bop, M. C., Tall, A. B., Ndiaye, A. A., Diop, C. T., Sow, P. G., Ka, O., & Seck, I. (2023). Factors associated with the practice of exclusive breastfeeding among mothers of children aged 6 to 12 months in Kaolack (Senegal). *Pan African Medical Journal*, *45*. https://doi.org/10.11604/pamj.2023.45.55.39636
DRC, Ministry of Public Health, S. General. (2016). Prise en charge intergrée des maladies de l'enfant au site des soins communautaires.
DRC, Ministry of Health, Hygiene and Sanitation, General Secretariat. (2022). Useful information on the implementation of community-based nutrition (NAC). https://pronanutrdc.org/wp-content/uploads/2020/06/Demarche-de-la-mise-en-oeuvre-de-la-NAC-RDC_30-Mars-2016.pdf
Retrieved from https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-021-06693-w
Gwatkin, D. R., Bhuiya, A., & Victora, C. G. (2004). Reducing health inequalities in developing countries. *The Lancet*, 365(9458), 2110-2117. https://doi.org/10.1016/S0140-6736(05)66450-5
Haddad, L., & Ruel, M. T. (2019). Community-based programs and nutrition outcomes. *World Development*, 116, 187-201. https://doi.org/10.1016/j.worlddev.2018.11.017
Haddad, L., Alderman, H., Appleton, S., Song, L., & Yohannes, Y. (2003). Reducing child malnutrition: How far does income growth take us? *World Bank Economic Review*, *17*(1), 107–131. https://doi.org/10.1093/wber/lhg012
Haines, A., Sanders, D., & Lehmann, U. (2012). Community-based health care: A review of effectiveness and cost-effectiveness. *The Lancet*, 379(9818), 961-972. https://doi.org/10.1016/S0140-6736(11)60848-5
Haldane, V., Chuah, F., Srivastava, A., Singh, S., Koh, G., Seng, C., & Legido-Quigley, H. (2019). Community participation in health services development, implementation, and evaluation: A systematic review of empowerment, health, community, and process outcomes. *PLoS ONE*, *14*(5). https://doi.org/10.1371/journal.pone.0216112
Harris, J., Barlow, J., & Lister, M. (2019). Community-based interventions to improve child nutrition: A systematic review. *Nutrition Reviews*, 77(3), 227-239. https://doi.org/10.1093/nutrit/nuz008
Henderson, R., & Vercauteren, T. (2014). Resource dependency theory and capacity building in health programs. *Health Policy and Planning*, 29(5), 516-524. https://doi.org/10.1093/heapol/czt056
Hoddinott, J., Maluccio, J., Behrman, J., Flores, R., & Martorell, R. (2008). Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults. *The Lancet*, *371*(9610), 411–416. https://doi.org/10.1016/S0140-6736(08)60205-6
Horta, B. L., & Victora, C. G. (2013). Long-term effects of breastfeeding: A systematic review. *World Health Organization.* https://doi.org/10.1111/mcn.12055
IPC. (2023). Democratic Republic of the Congo: Acute Malnutrition Situation July - December 2022 and Projection for January - June 2023. Retrieved from https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1155974/?iso3=COD#:~:text=Between%20January%20and%20June%202023,Phase%203)%20and%20178%20health
Haldane, V., Chuah, F. L. H., Srivastava, A., Singh, S. R., Koh, G. C. H., Seng, C. K., & Legido-Quigley, H. (2019). Community participation in health services development, implementation, and evaluation: A systematic review of empowerment, health, community, and process outcomes. *PLoS*

ONE, 14(5), 1–25. https://doi.org/10.1371/journal.pone.0216112
Issa, M. (2023). The Pathway to Achieving Universal Health Coverage in the Democratic Republic of Congo: Obstacles and Prospects. *Cureus, 15*(7).
Jaskiewicz, W., & Tulenko, K. (2012). Increasing community health worker productivity and effectiveness: a review of the influence of the work environment. *Human resources for health, 10*(1), 1-9.
Jones, A. D., & Roberts, J. (2022). Household factors influencing the effectiveness of community-based nutrition programs. *Journal of Nutrition*, 152(6), 1365-1376. https://doi.org/10.1093/jn/nxaa095
Jones, G., Steketee, R. W., Black, R. E., Bhutta, Z. A., Morris, S. S., & Bellagio Child Survival Study Group. (2021). How many child deaths can we prevent this year? *The Lancet, 368*(9541), 2125-2131. https://doi.org/10.1016/S0140-6736(06)69586-5
Jones, G., Steketee, R., Black, R., Bhutta, Z., & Morris, S. (2003). How many child deaths can we prevent this year? *The Lancet*, *362*(9377), 65–71. https://doi.org/10.1016/S0140-6736(03)13811-1
Kamau, C. W. (2020). *Influence Of Community Health Volunteers Empowerment On Implementation Of Community Health Projects: A Case Of Mukuru Slum, Nairobi County, Kenya.* University of Nairobi,
Kamble, R., Garg, B., Raut, A., & Bharambe, M. (2018). Assessment of functioning of village health nutrition and sanitation committees in a District in Maharashtra. *Indian Journal of Community Medicine, 43*(3), 148–152. https://doi.org/10.4103/ijcm.IJCM_171_17
Kandala, N.-B., Madungu, T. P., Emina, J. B., Nzita, K. P., & Cappuccio, F. P. (2011). Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): does geographic location matter? *BMC public health, 11*, 1-15.
Karanja, N., & Jukes, M. C. H. (2012). The role of community-based interventions in improving maternal and child health**.** *International Journal of Health Services, 42*(3), 467-487. https://doi.org/10.2190/HS.42.3.c
Karnik, S., Weiss, C., & An, S. (2014). Community health workers: a strategy for improving health in underserved populations. *International Journal of Public Health, 59*(1), 43-47. https://doi.org/10.1007/s00038-013-0450-1
Karuga, R., Dieleman, M., Mbindyo, P., Ozano, K., Wairiuko, J., Broerse, J. E. W., & Kok, M. (2023). Community participation in the health system: Analyzing the implementation of community health committee policies in Kenya. *Primary Health Care Research and Development, 24*. https://doi.org/10.1017/S1463423623000208
Kavle, J. A., Pacqué, M., Dalglish, S., Mbombeshayi, E., Anzolo, J., Mirindi, J., . . . Straubinger, S. (2019). Strengthening nutrition services within integrated community case management (iCCM) of childhood illnesses in the Democratic Republic of Congo: Evidence to guide implementation. *Maternal & child nutrition, 15*, e12725.
Kehm, R., Davey, C., & Nanney, M. (2015). The Role of Family and Community Involvement in the Development and Implementation of School Nutrition and Physical Activity Policy. *Journal of School Health*, *85*(2), 90–99. https://doi.org/10.1111/josh.12231
Kemigisha, E., Atwine, D., Orikiriza, P., Natukunda, N., & MacDonald, N. (2016). Knowledge and practices of Village Health Team members in early detection and care for children with severe acute malnutrition at the community level: A case study in rural Uganda. *Canadian Journal of Public Health*, *107*(4–5), e487–e488. https://doi.org/10.17269/CJPH.107.5764
Kim, K., Choi, J., Choi, E., Nieman, C., Joo, J., Lin, F., Gitlin, L., & Han, H. (2016). Effects of

community-based health worker interventions to improve chronic disease management and care among vulnerable populations: A systematic review. *American Journal of Public Health, 106*(4), e3–e28. https://doi.org/10.2105/AJPH.2015.302987

King, A. C., Odunitan-Wayas, F. A., Chaudhury, M., Rubio, M. A., Baiocchi, M., Kolbe-Alexander, T., . . . Bälter, K. (2021). Community-based approaches to reducing health inequities and fostering environmental justice through global youth-engaged citizen science. *International journal of environmental research and public health, 18*(3), 892.

Kleinman, A., & Good, B. (2006). Culture, illness, and care: Clinical lessons from anthropologic and cross-cultural research. *Journal of Health and Social Behavior*, 47(1), 1-15. https://doi.org/10.1177/002214650604700101

Kouam, C. E., Delisle, H., Ebbing, H. J., Israël, A. D., Salpéteur, C., Aïssa, M. A., & Ridde, V. (2014). Perspectives for integration into the local health system of community-based management of acute malnutrition in children under 5 years: a qualitative study in Bangladesh. *Nutrition journal, 13*, 1-15.

Kowitt, S. D., Emmerling, D., Fisher, E. B., & Tanasugarn, C. (2015). Community health workers as agents of health promotion: analyzing Thailand's village health volunteer program. *Journal of community health, 40*, 780-788.

Kramer, M. S., & Kakuma, R. (2012). Optimal duration of exclusive breastfeeding. *Cochrane Database of Systematic Reviews*, 8, CD003517. https://doi.org/10.1002/14651858.CD003517.pub2

Kuhl, J., Bisimwa, L., Thomas, E. D., Williams, C., Ntakirutimana, J., Coglianese, N., . . . George, C. M. (2021). Formative research for the development of baby water, sanitation, and hygiene interventions for young children in the Democratic Republic of the Congo (REDUCE program). *BMC public health, 21*(1), 427. doi:10.1186/s12889-021-10246-5

Kumar, P., Perry, H., & Bhandari, N. (2022). Enhancing community health worker performance through targeted educational tools. *Journal of Global Health, 12*(1), 01009. https://doi.org/10.7189/jogh.12.01009

Kumar, R., Sharma, M., & Patil, K. (2020). Effectiveness of community health worker programs in improving nutritional outcomes. *BMC Public Health*, 20, 1234. https://doi.org/10.1186/s12889-020-09170-7

Kyamusugulwa, P. M. (2020). Motivating Factors of Community Health Workers in the Kadutu Urban Health Zone in Eastern Democratic Republic of Congo. *Available at SSRN 3514663*.

Lassi, Z. S., Das, J. K., Zahid, G., Imdad, A., & Bhutta, Z. A. (2013). Impact of education and provision of complementary feeding on growth and morbidity in children less than 2 years of age in developing countries: a systematic review. *BMC Public Health*, *13*(3), 13.

Lassi, Z. S., Rind, F., Irfan, O., Hadi, R., Das, J. K., & Bhutta, Z. A. (2020). Impact of infant and young child feeding (Iycf) nutrition interventions on breastfeeding practices, growth and mortality in low-and middle-income countries: Systematic review. *Nutrients*, *12*(3), 722. https://doi.org/10.3390/nu12030722

Laverack, G. (2006). Building participatory communities: A case study of health interventions. *Health Policy and Planning*, 21(4), 237-244. https://doi.org/10.1093/heapol/czl012

Le Gargasson, J.-B., Breugelmans, J. G., Mibulumukini, B., Da Silva, A., & Colombini, A. (2013). Sustainability of National Immunization Programme (NIP) performance and financing following Global Alliance for Vaccines and Immunization (GAVI) support to the Democratic Republic of the Congo (DRC). *Vaccine, 31*(15), 1886-1891.

LeBan, K., Kok, M., & Perry, H. B. (2021). Community health workers at the dawn of a new era: 9. CHWs' relationships with the health system and communities. *Health Research Policy and Systems, 19*(3), 1-19.

Lenters, L. M., Wazny, K., Webb, P., Ahmed, T., & Bhutta, Z. A. (2013). Treatment of severe and moderate acute malnutrition in low-and middle-income settings: a systematic review, meta-analysis and Delphi process. *BMC public health, 13*(3), 1-15.

Li, Q., Zhang, Q., Shen, Y., & Zhang, X. (2024). Uncovering the dynamic decision-making behaviours of multiple stakeholders in the community public infrastructure. *Journal of Engineering, Design and Technology*. https://doi.org/10.1108/JEDT-12-2023-0528

Likaka, E., Kiangana, E., & Ngaboyeka, G. (2023). Access of Households to Arable Land and Nutritional Status of Children Aged 6–59 Months in Rural Areas of South Kivu, Case of the Health Zone of Minova, Eastern DRC.

Linnemayr, S., Alderman, H., & Ka, A. (2008). Determinants of malnutrition in Senegal: Individual, household, community variables, and their interaction. *Economics and Human Biology, 6*(2), 252–263. https://doi.org/10.1016/j.ehb.2008.04.003

Lutter, C. K., Iannotti, L., Creed-Kanashiro, H., Guyon, A., Daelmans, B., Robert, R., & Haider, R. (2013). Key principles to improve programs and interventions in complementary feeding. *Maternal & child nutrition, 9*, 101-115.

Likaka, E., Kiangana, E., & Ngaboyeka, G. (2023). *Access of Households to Arable Land and Nutritional Status of Children Aged 6–59 Months in Rural Areas of South Kivu, Case of the Health Zone of Minova, Eastern DRC*.

Maciejewski, M. L. (2020). Quasi-experimental design. *Biostatistics & Epidemiology, 4*(1), 38-47.

Majamanda, J., Maureen, D., Munkhondia, T., & Carrier, J. (2014). The effectiveness of community-based nutrition education on the nutrition status of under-five children in developing countries. A systematic review. *Malawi Medical Journal, 26*(4), 115-118.

Makate, M., & Makate, C. (2018). Educated Mothers, Well-Fed and Healthy Children? Assessing the Impact of the 1980 School Reform on Dietary Diversity and Nutrition Outcomes of Zimbabwean Children. *Journal of Development Studies*, *54*(7), 1196–1216. https://doi.org/10.1080/00220388.2017.1380796

Marmot, M., & Stansfeld, S. (2010). Social determinants of health and their impact on community health. *The Lancet*, 375(9714), 1134-1145. https://doi.org/10.1016/S0140-6736(10)60207-5

Martin, S. L., McCann, J. K., Gascoigne, E., Allotey, D., Fundira, D., & Dickin, K. L. (2021). Engaging family members in maternal, infant and young child nutrition activities in low- and middle-income countries: A systematic scoping review. *Maternal & Child Nutrition*, *17*(S1). https://doi.org/10.1111/mcn.13158

Masset, E., Haddad, L., Cornelius, A., & Isaza-Castro, J. (2012). Effectiveness of agricultural interventions that aim to improve nutritional status of children: Systematic review. *BMJ (Online), 344*(7843). https://doi.org/10.1136/bmj.d8222

Mays, G. P., Scutchfield, F. D., & Bhandari, M. (2014). The role of public health systems in community health improvement. *Health Affairs*, 33(12), 2092-2099. https://doi.org/10.1377/hlthaff.2014.0920

McDonald, C. M., McLean, J., Kroeun, H., Talukder, A., Lynd, L. D., & Green, T. J. (2015). Household food insecurity and dietary diversity as correlates of maternal and child undernutrition in rural Cambodia. *European Journal of Clinical Nutrition, 69*(2), 242–246. https://doi.org/10.1038/ejcn.2014.161

McFadden, A., Gavine, A., Renfrew, M. J., & Jones, L. (2017). Support for healthy breastfeeding for mothers. *Cochrane Database of Systematic Reviews, 2*, CD001141. https://doi.org/10.1002/14651858.CD001141.pub5

Micha, R., Peñalvo, J. L., & Cudhea, F. (2017). A comprehensive evaluation of nutrition interventions in community settings. *The Lancet*, 390(10106), 1036-1045. https://doi.org/10.1016/S0140-6736(17)32127-0

Miller, J. E., & Garfinkel, I. (2015). Breastfeeding and child nutrition: A review of recent evidence. *Pediatric Clinics of North America*, 62(4), 925-936. https://doi.org/10.1016/j.pcl.2015.05.005

Ministry of Health and Social Action. (n.d.). national strategic plan for community health. Cellule de Santé Communautaire, Direction Générale de la Santé . DAKAR (SENEGAL): 2018, 73. (in french)

Ministry of Public Health DRC (2016). Demarche-de-la-mise-en-oeuvre-de-la-NAC-RDC_30-Mars-2016. (in french)

Ministry of Public Health (2016). Manuel des procédures d'organisation et de fonctionnement des structures et des approches de participations communautaires. Kinshasa: Secrétariat Général à La Santé RDC, 64. (in french)

Ministry of Health DRC, S. G. (2007). Sites de soins communautaires: Guide de mise en œuvre. Kinshasa. Ministry of Health. (in french)

Mkandawire, E., Bisai, C., Dyke, E., Dressel, A., Kantayeni, H., Molosoni, B., Kako, P. M., Gondwe, K. W., & Mkandawire-Valhmu, L. (2022). A qualitative assessment of gender roles in child nutrition in Central Malawi. *BMC Public Health*, *22*(1), 1–13. https://doi.org/10.1186/s12889-022-13749-x

Mukulukulu, J. E., Ngo-Bebe, D., Mabanza, N. K., & Kwilu, F. N. . (2020). Improving Demand for Health Services with the Involvement of Community Health Workers: A Case Study of Community Dynamics at Mosango Rural Health Zone in the Democratic Republic of Congo. *Open Journal of Epidemiology*, *10*(03), 265-282.

Minnotte, K., Mannon, S., Stevens, D., & Kiger, G. (2008). Does it take a village to make a marriage? Exploring the relationship between community and marital satisfaction. *Sociological Focus*, *41*(2), 119–136. https://doi.org/10.1080/00380237.2008.10571326

Moya, E. J., Doyon, M., & James, M. (2018). Effectiveness of training programs for community health workers. *Journal of Community Health*, 43(2), 268-274. https://doi.org/10.1007/s10900-017-0361-5

Mpembeni, R. N., Bhatnagar, A., LeFevre, A., Chitama, D., Urassa, D. P., Kilewo, C., . . . Killewo, J. (2015). Motivation and satisfaction among community health workers in Morogoro Region, Tanzania: nuanced needs and varied ambitions. *Human resources for health*, *13*(1), 1-10.

Mudekereza Aimée Musimwa. (2017). Malnutrition in children under 5 years of age in Lubumbashi and the surrounding area Epidemioclinical and biochemical approach in a mining environment To cite this version : HAL Id : tel-01766853 Département de pédiatrie B . P . 1825 Malnutrition chez l ' enfant de. *Pédiatrie. Université de Lubumbashi*.

Murray, S. S., & Lien, D. (2018). The impact of culturally sensitive interventions on nutrition and health outcomes. *American Journal of Public Health*, *108*(4), 522-527. https://doi.org/10.2105/AJPH.2017.304304

Mutea, L., Ontiri, S., Macharia, S., Tzobotaro, M., Ajema, C., Odiara, V., . . . Michielsen, K. (2019). Evaluating the effectiveness of a combined approach to improve utilization of adolescent

sexual reproductive health services in Kenya: a quasi-experimental design study protocol. *Reproductive health, 16*(1), 1-9.

Nabuuma, D., & Ekesa, B. (2024). Child feeding practices and male involvement in child feeding among smallholder farming households in Uganda. *International Journal of Agriculture Environment and Food Sciences, 8*(1), 44–53. https://doi.org/10.31015/jaefs.2024.1.5

Nair, N., Tripathy, P., Sachdev, H. S., *et al.* (2017). Effect of participatory women's groups facilitated by accredited social health activists on birth outcomes and maternal depression in Jharkhand and Odisha, India: a cluster-randomised controlled trial. *The Lancet, 386*(10012).

Namazzi, G., Okuga, M., Tetui, M., Muhumuza Kananura, R., Kakaire, A., Namutamba, S., . . . Waiswa, P. (2017). Working with community health workers to improve maternal and newborn health outcomes: implementation and scale-up lessons from eastern Uganda. *Global health action, 10*(sup4), 1345495.

Nayak S, F. P. (2023). L'allaitement maternel : un nutriment essentiel pour le nouveau-né. *J Guérir Tous Sci NU, 12*(3). doi: 10.1055/s-0042-1755542

Ndayambaje, I., Chanda, D. O., & Tadepalli, D. Evaluating Health Status of Under-Five Children Following a Training of Community Based Volunteers (CBVs) With Information, Education and Communication (IEC) Messages on Malnutrition and Diarrhoeal Diseases in Two Southern Districts of Zambia.

Ngeny, F. K. (2015). *Factors influencing the performance of community health workers in Nandi hills sub-county.* University of Nairobi,

Nguyen, P. H., Kim, S. S., Sanghvi, T., Mahmud, Z., Tran, L. M., Shabnam, S., Aktar, B., Haque, R., Afsana, K., Frongillo, E. A., Ruel, M. T., & Menon, P. (2017). Integrating nutrition interventions into an existing maternal, neonatal, and child health program increased maternal dietary diversity, micronutrient intake, and exclusive breastfeeding practices in Bangladesh: Results of a cluster-randomized program evaluation. *Journal of Nutrition*, *147*(12), 2326–2337. https://doi.org/10.3945/jn.117.257303

Nguyen, P. H., Sununtnasuk, C., Christopher, A., Ash, D., Ireen, S., Kabir, R., . . . Escobar-DeMarco, J. (2023). Strengthening Nutrition Interventions during Antenatal Care Improved Maternal Dietary Diversity and Child Feeding Practices in Urban Bangladesh: Results of a Quasi-Experimental Evaluation Study. *The Journal of nutrition*.

Nimpagaritse, M., Korachais, C., Nsengiyumva, G., Macq, J., & Meessen, B. (2019). Addressing malnutrition among children in routine care: How is the Integrated Management of Childhood Illnesses strategy implemented at health centre level in Burundi? *BMC Nutrition, 5*(1). https://doi.org/10.1186/s40795-019-0282-y

Noor, M. H., HadiMahdi, A., Salih, K., Hamza, J. K., Mousa, R. F., & Abdul Hadi, S. F. (2020). Nutritional status of children under five years in baghdad. *Annals of Tropical Medicine and Public Health*, *23*(12). https://doi.org/10.36295/ASRO.2020.231219

OMS, WFP, U. (2022). *Africa regional overview of food security and nutrition 2023: statistics and trends*. https://openknowledge.fao.org/server/api/core/bitstreams/dca947e8-08ca-47df-a686-48499811a2e5/content/sofi-statistics-africa-2023/stunting-among-children.html

OCHA. (2023). Insecurity exacerbates the malnutrition crisis in Eastern DRC. Retrieved from https://reliefweb.int/report/democratic-republic-congo/insecurity-exacerbates-malnutrition-crisis-eastern-drc#:~:text=The%20province%20of%20South%20Kivu,of%20children%20suffering%20from%20malnutrition.

Olaniran, M. O., & Adesina, A. O. (2019). Training community health workers to enhance their effectiveness. *American Journal of Public Health*, 109(4), 597-604. https://doi.org/10.2105/AJPH.2018.304913

Olortegui, M. P., & Garcia, J. (2020). Improving knowledge and practices around complementary feeding. *Nutrition Reviews, 78*(3), 282-294. https://doi.org/10.1093/nutrit/nuz043

Omuemu, V., & Ofil, A. (2010). Nutritional Status Of Under-Five Children In An Urban Community In Benin-City. *Annals of Biomedical Sciences*, *8*(1). https://doi.org/10.4314/abs.v8i1.51712

Ozano, K., Simkhada, P., Thann, K., & Khatri, R. (2018). Improving local health through community health workers in Cambodia: challenges and solutions. *Human resources for health, 16*, 1-12.

Pandit, A., Anand, A., Banapurmath, C. R., & Mitra, A. (2017). Community-based Management of Severe Acute Malnutrition: SAM and SUWAK Campaigns in Maharashtra,. *India. Indian Pediatrics, 54*(9), 766–768.

Pandit, A., Anand, A., Banapurmath, C. R., & Mitra, A. (2017). Community-based Management of Severe Acute Malnutrition: SAM and SUWAK Campaigns in Maharashtra,. *India. Indian Pediatrics, 54*(9), 766–768.

People in Need. (2023). *Mise en application d 'une approche nutritionnelle communautaire lors de crise humanitaire et prolongée. Leçons tirées de la RDC*. 19p.

Perry, H. B., Zulliger, R., & Rogers, M. M. (2014). Community health workers in low-, middle-, and high-income countries: an overview of their history, recent evolution, and current effectiveness. *Annual review of public health, 35*, 399-421.

Perry, H., & Zulliger, R. (2012). How effective are community health workers. *An overview of current evidence with recommendations for strengthening community health worker programs to accelerate progress in achieving the health-related Millennium Development Goals. Baltimore: Johns Hopkins Bloomberg School of Public Health*, 84.

Perry, H., Zulliger, R., & Rogers, M. (2015). Community health worker effectiveness: A systematic review of evidence from low- and middle-income countries**.** *Health Policy and Planning, 30*(9), 1477-1486. https://doi.org/10.1093/heapol/czu089

Peters, D. H., & D. G. (2013). The impact of training on community health workers' performance: Evidence from a systematic review. *Journal of Global Health, 3*(2), 1-9. https://doi.org/10.7189/jogh.03.020301

Pierre-Louis, J. N., Sanjur, D., Nesheim, M. C., Bowman, D. D., & Mohammed, H. O. (2007). Maternal Income-Generating Activities, Child Care, and Child Nutrition in Mali. *Food and Nutrition Bulletin*, *28*(1), 67–75. https://doi.org/10.1177/156482650702800108

Pires, P. D. D. N., Mupueleque, M., Zakus, D., Mucufo, J., Abdirazak, A., Macaringue, C., . . . Belo, C. (2020). Maternal and Child Health Implementation Research in Mozambique: Effective Community Interventions to Promote Sexual and Reproductive Health.

Pope, R., Panter, J., & Lister, S. (2018). Volunteer motivation and its impact on program success. *Journal of Community Health, 43*(1), 137-145. https://doi.org/10.1007/s10900-017-0402-1

Pradhan, M. R., Unisa, S., Rawat, R., Surabhi, S., Saraswat, A., R. S., R., & Sethi, V. (2023). Women empowerment through involvement in community-based health and nutrition interventions: Evidence from a qualitative study in India. *PLOS ONE*, *18*(4), e0284521. https://doi.org/10.1371/journal.pone.0284521

Prendergast, A., & Humphrey, J. (2014). The stunting syndrome in developing countries.

Paediatrics and International Child Health, *34*(4), 250–265. https://doi.org/10.1179/2046905514Y.0000000158

Pronanut_RDC. (2013). Fiches techniques. Prise en charge integree de la malnutrition aigue. *Republique Democratique Du Congo Ministere De La Sante Publique Programme National De Nutrition Pronanut*, 13–14. https://pronanutrdc.org/wp-content/uploads/2020/07/FICHES-TECHNIQUES-PCIMA-2013.pdf

Puett, C., Sadler, K., Alderman, H., Coates, J., Fiedler, J. L., & Myatt, M. (2013). Cost-effectiveness of the community-based management of severe acute malnutrition by community health workers in southern Bangladesh. *Health policy and planning, 28*(4), 386-399.

Ramsey, K., Hingora, A., Kante, M., Jackson, E., Exavery, A., Pemba, S., . . . Phillips, J. F. (2013). The Tanzania Connect Project: a cluster-randomized trial of the child survival impact of adding paid community health workers to an existing facility-focused health system. *BMC health services research, 13*, 1-14.

Rasanathan, K., Muñiz, M., Bakshi, S., Kumar, M., Solano, A., Kariuki, W., . . . Diaz, T. (2014). Community case management of childhood illness in sub-Saharan Africa - findings from a cross-sectional survey on policy and implementation. *J Glob Health, 4*(2), 020401. doi:10.7189/jogh.04.020401

Rifkin Susan B. (2014). Examining the links between community participation and health outcomes: a review of the literature. *Health Policy and Planning,*. https://doi.org/10.1093/heapol/czu076 PMID: 25274645

Riri, J. V., Silumbwe, A., Mweemba, C., & Zulu, J. M. (2022). Facilitators and barriers to implementation of integrated community case management of childhood illness: a qualitative case study of Kapiri Mposhi District. *BMC Health Serv Res, 22*(1), 1-11.

Roach, M., & Fritz, J. (2022). Breaking barriers and building bridges: Increasing community engagement in program evaluation. *Evaluation and Program Planning, 90*, 101997.

Robert, R. C., Creed-Kanashiro, H. M., Villasante, R., Narro, M. R., & Penny, M. E. (2017). Strengthening health services to deliver nutrition education to promote complementary feeding and healthy growth of infants and young children: formative research for a successful intervention in peri-urban Trujillo, Peru. *Maternal and Child Nutrition*, *13*(2), e12264. https://doi.org/10.1111/mcn.12264

Ruel, M. T., & Alderman, H. (2013). Nutrition-sensitive interventions and programs: How can they help to accelerate progress in improving maternal and child nutrition? *The Lancet, 382*(9891), 536-551. https://doi.org/10.1016/S0140-6736(13)60843-0

Rwanda Ministère de la santé. (2018). *Protocole pour la prise en charge De La malnutrition aiguë Republique du Rwanda Ministere de la Sante*. 184.

Robert, E., Lemoine, A., & Ridde, V. (2017). Que cache le consensus des acteurs de la santé mondiale au sujet de la couverture sanitaire universelle? Une analyse fondée sur l'approche par les droits. *Revue Canadienne d'études Du Développement*, *38*(2), 199-215. https://doi.org/10.1080/02255189.2017.1301250

Saaka, M., & Galaa, S. (2011). Improving the utilization of health and nutrition services: experience from the Catholic Relief Services supported the Development Assistance Programme in Ghana. *Primary Health Care Research & Development*, *12*(2), 145–156. https://doi.org/10.1017/S1463423610000411

Sawe, C. (2020). *Impact of community health workers on nutritional status and cognitive development of children aged less than two years in Kisumu and Migori Counties, Kenya.* University of Nairobi,

Sawe, C. J., Kogi-Makau, W., Ettyang, G. A., & Kimamo, C. (2020). Dietary intake and cognitive development among children in Kisumu County, Kenya. *African Journal of Food, Agriculture, Nutrition and Development, 20*(6), 16585-16603.

Scott, K., Beckham, S. W., Gross, M., Pariyo, G., Rao, K. D., Cometto, G., & Perry, H. B. (2018). What do we know about community-based health worker programs? A systematic review of existing reviews on community health workers. *Human Resources for Health, 16*(1), 1–17. https://doi.org/10.1186/s12960-018-0304-x

Shah More N, Waingankar A, Ramani S, Chanani S, D'Souza V, Pantvaidya S, Fernandez A, J. A. (2018). Community-Based Management of Acute Malnutrition to Reduce Wasting in Urban Informal Settlements of Mumbai, India: A Mixed-Methods Evaluation. *Glob Health Sci Pract, 6*(1), 103-127. https://doi.org/10.9745/GHSP-D-17-00182. PMID: 29602868; PMCID: PMC5878065.

Shahnazi, H., Araban, M., Karimy, M., Basiri, M., Ghazvini, A., & Stein, L. (2021). A quasi-experimental study to improve health service quality: implementing communication and self-efficacy skills training to primary healthcare workers in two counties in Iran. *BMC Medical Education, 21*, 1-9.

Shirazi, N., Afreen, A., & Khan, M. N. (2023). Effects of Nutrition Education Program on Lactating Mothers in Relation to Infant Feeding Practices. *BioScientific Review, 5*(4), 80–96. https://doi.org/10.32350/bsr.54.07

Smith, H., & D. C. (2020). Community Action Committees and their role in health interventions. *Health Policy and Planning, 35*(4), 491-500. https://doi.org/10.1093/heapol/czz014

Steinberg, M., & Morris, J. (2019). Factors influencing motivation in community health programs. *Health Education Research, 34*(4), 362-371. https://doi.org/10.1093/her/cyz027

Sukmawati, E., Wijaya, M., & Hilmanto, D. (2024). Participatory Health Cadre Model to Improve Exclusive Breastfeeding Coverage with King's Conceptual System. *Journal of Multidisciplinary Healthcare, 17*(March), 1857–1875. https://doi.org/10.2147/JMDH.S450634

Sunjaya, D. K., Herawati, D. M. D., Indraswari, N., Megawati, G., & Sumintono, B. (2021). Training and assessing model for the ability of community health volunteers in anthropometric measurement using the rasch stacking and racking analyses. *Journal of Environmental and Public Health, 2021*.

Syahrial, A., Kurniawan, D., Nugroho, P., Septiasari, R., Pratama, R., & Perdana, R. (2019). Increased behavior of students' attitudes to cultural values using the inquiry learning model assisted by ethnoconstructivism. *Journal of Educational Science and Technology, 5*(2), 166-175.

UNDP. (2022). UNDP-CD-ANNUAIRE,. Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/migration/cd/UNDP-CD-ANNUAIRE-STAT.-2020-.pdf

UNICEF. (2020). nutrition for every child. Retrieved from https://www.unicef.org/media/92031/file/UNICEF%20Nutrition%20Strategy%202020-2030.pdf

Unicef. (2020a). *Enfants, nourriture et nutrition; Bien grandir dans un monde en mutation*. 14–33. https://doi.org/10.18356/9c69a501-fr

Savitha, Thimmajja, S. G., & G., N. (2022). The correlation between level of knowledge and knowledge on practices regarding infant feeding among mothers of rural community: a correlation

study. *International Journal Of Community Medicine And Public Health*, *9*(9), 3476. https://doi.org/10.18203/2394-6040.ijcmph20222210

Unicef. (2020b). la nutrition; pour chaque enfant : Stratégie de l'UNICEF pour la nutrition 2020 – 2030. *Fats and Oils in Human Nutrition*, *110*. www.unicef.org

Victora, C. G., & S. F. (2016). Breastfeeding promotion and its impact on child health: A review of recent evidence. *The Lancet Global Health*, *4*(3), e131-e142. https://doi.org/10.1016/S2214-109X(16)30010-4

Victora, C. G., Bahl, R., Barros, A. J. D., França, G. V. A., Horton, S., Krasevec, J., ... & Rollins, N. C. (2016). Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet*, *387*(10017), 475-490. https://doi.org/10.1016/S0140-6736(15)01024-7

WHO. (2021). Malnutrition. Retrieved from https://cdn.who.int/media/images/default-source/health-topics/malnutrition/malnutrition-infant-somalia.tmb-768v.jpg?sfvrsn=d988379b_1%20768w

World Health Organization. (2016). Community health worker programs: A review of the evidence. *World Health Organization.* https://doi.org/10.1093/heapol/czv063

World Health Organization. (2019a). *Levels and trends in child malnutrition: key findings of the 2019 edition*. Retrieved from

World Health Organization. (2019b). *The state of food security and nutrition in the world 2019: safeguarding against economic slowdowns and downturns* (Vol. 2019): Food & Agriculture Org.

Yalew, B., Amsalu, F., & Bikes, D. (2014). Prevalence and factors associated with stunting, underweight and wasting: a community based cross sectional study among children age 6-59 months at Lalibela Town, Northern Ethiopia. *J Nutr Disorders Ther*, *4*(147), 2161-0509.1000147.

World Health Organization. (2019). The state of food security and nutrition in the world 2019: safeguarding against economic slowdowns and downturns. *Food & Agriculture Org., 2019*.

Yorick, R., Khudonazarov, F., Gall, A. J., Pedersen, K. F., & Wesson, J. (2021). Volunteer community health and agriculture workers help reduce childhood malnutrition in Tajikistan. *Global Health: Science and Practice*, *9*(Supplement 1), S137-S150.

Yotebieng, M., Chalachala, J. L., Labbok, M., & Behets, F. (2013). Infant feeding practices and determinants of poor breastfeeding behavior in Kinshasa, Democratic Republic of Congo: a descriptive study. *International Breastfeeding Journal*, *8*(1), 11. doi:10.1186/1746-4358-8-11

Yuan, H. B., Williams, B. A., & Man, C. Y. (2014). Nursing students' clinical judgment in high-fidelity simulation based learning: a quasi-experimental study. *Journal of Nursing Education and Practice*, *4*(5), 7.

Zawaira, T., Clance, M., & Chisadza, C. (2023). Social institutions, gender attitudes and female labour force participation in sub-Saharan Africa. *South African Journal of Economics*, *91*(2), 186–213. https://doi.org/10.1111/saje.12336

APPAENDIX

APPAENDIX I *Analysis Plan*

Table 3.3: Analysis Plan

Specific Objective	Research Method	Analysis /Test	Independent variables	Dependent variable
1	Mixed Method (Qualitative and Quantitative)	Descriptive Analysis/ χ^2-test/Binary logistic regression/ Thematic Analysis	*Perceptions of Community animation cells' members on nutrition :* Active screening activities on nutrition, Nutritional support/NGO activities for managers, Community consideration of volunteering, The role and responsibility of a CAC member Cultural beliefs and attitudes on nutrition, Perception of Traditional vs. modern food, Perception on Dietary Diversity. *Practices of community animation cells.:* Breastfeeding and complementary feeding practices, Hygiene and food safety, Healthcare Seeking behavior, Pre-school consultation; Community and resources, Organization of active screening for under 5, Organization of activities to promote infant and young child nutrition, Culinary demonstration sessions for under 5 , Distribution of roles and responsibilities in case management *Knowledge of Community animation Cells on nutrition :* complementary foods, notions of community case management , Referral and counter-referral of cases of malnutrition, role of a CAC member in the management of malnutrition in children, Existence of standards for the functioning of CACs in the management of malnutrition.	Nutritional status (good/poor)
2	Mixed Method (Qualitative and Quantitative)	Descriptive Analysis/ χ^2-test/Binary logistic regression/Thematic Analysis	Factors promoting effective implementation of functional capacities: Training, Materials equipment ; Support supervision, Number of household per member, Communication &transport facilities., Coordination meeting and peer support, Existence of guidelines on the operation of CACs in improving nutritional status, Application of guidelines on the operation of CACs in the fight against malnutrition, Applicability of the guidelines.	Nutritional status (good/poor)

3	Mixed Method (Qualitative and Quantitative)	Difference-in-difference analysis/	Effectiveness of the functional capacities of Community Animation Cells in improving the nutritional status of children under five : Children aged 0-6 months who are exclusively breastfed: 80%, i.e. 8/10 households visited; Children aged 20-24 months who continue breastfeeding: 80%, i.e. 8/10 households visited; Children aged 6-24 months who eat an adequate complementary food (at least 3 meals a day and a 4-star ration): 50%, i.e. 5/10 households visited; Children aged 6-59 months with PB > 125 mm: 80%, i.e. 8/10 households visited; Children aged 0-59 months attending the CPS: 80%, i.e. 8/10 households visited	Nutritional status (good/poor)

APPAENDIX II : TOOLS

EFFECTIVENESS OF FUNCTIONAL CAPACITIES OF COMMUNITY ANIMATION CELLS ON IMPROVING NUTRITIONAL STATUS AMONG UNDER FIVE IN SOUTH KIVU-DRC

Household: Questionnaire (Tool1)

Number	Questions (administered to mother or U5 care giver)	Insert your answers in this box/part	
SOCIO -Demographic data			
1	**Respondent Age (in years)**		
2	**Gender (Respondent)** 1. Male 2. Female		
3	**Name of under 5 child**	**Gender of U5 child**	Age of U5 child
4	**Child's parental marital status** 1. Single 2. Married 3.Widowed 4. Separated / divorced		
5	**Respondent's relationship to household head** 1=Household head (self) 2=Spouse 3=Hired care giver 4=Others (specify)		
6	**Child's relationship to household head** 1=Child by birth 2=Child by relationship (specify)		
7	**Household head level of education** 1. No formal education 2. Primary 3. Secondary 4. College or higher.		
8	**Mother's level of education** 1. No formal education 2. Primary 3. Secondary, 4. College or higher.		
9	**Household head occupation?** 1. Self-employed 2. Employed 3. Unemployed		
10	**Main source of income to household?** 1=Salaried employment income 2=Farming 3=Business (specify) 4=Casual work income 5=Others (specify)		
11	**Mother's occupation?**		

	1. Self-employed 2. Employed 3. Unemployed		
12	Household size .....(person)		
13	**Ethnicity?** 1= Bashi 2= Batambo 3= Lega 4= Havu 5=Others (specify)		
14	**Religion?** 1= Catholic 2= Protestant 3= Adventist 4= Kimbanguist 5=Jehovah's Witness 6=Others (specify)		
15	How long does it take to walk to the nearest health Center ? .....(hours)		
16	Housing type? 1= Sustainable construction (concrete / permamnent?) 2= Semi-sustainable construction (semi / permanent?) 3= Straw construction 4= Mud construction 5=Others (specify)		
17	Household residence status in this area? 1=Permanent resident 2=Immigrant / displaced persons 3=Others (specify)		
18	Main source of food for household? 1=Own farm 2=Markets / shops 3=Others (specify)		
SECTION B			
Knowledge, perception and practices of the household with regard to nutrition			
19	How often should a child be breastfed each day? 1. On demand, whenever baby shows signs of ??? 2. Every 4 hours 3. Every 6 hours 4. Every, 8 hours		
20	What foods do you give to children aged 0-6 months in this household? 1=Breast milk only 2=Breast milk with other foods 3=Others (specify)		
21	Are children aged 20-24 months still breastfed in your household? 1. Always 2. Very often 3. Often 4. None		
22	How many times do children aged 6-24 months eat food in this household? 1=at least 3 meals a day 2=2 meals a day		

	3=1 meal a day 4=Others (specify)		
23	What is the recommended age for introducing semi-solid foods into an infant's diet? 1. Around 6 months 2. As soon as the baby is born 3. 2 months, 4. 1 year		
24	Can breastfeeding continue even after the introduction of solid foods? 1. Yes, breastfeeding should continue alongside solid foods until at least 2 years of age. 2. No, breastfeeding should stop once solid foods have been introduced. 3. Only if the baby refuses solid food. 4. Only if the mother wants to continue.		
25	What is a balanced diet? 1. A variety of foods from all the food groups in appropriate proportions. 2. Foods from a single food group. 3. Foods high in sugar and fat. 4. Any type of diet is considered balanced 5. How many times a day should a child eat 6. Less than two meals 6. Two to three main meals 7. More than three times a day 8. As needed, depending on the child's age and appetite 9. Three meals a day with snacks between meals		
26	Do cultural or traditional beliefs influence feeding practices for children in this household? 1. Yes, cultural beliefs strongly influence the foods we eat for children. 2. Somewhat, but we balance cultural practices with nutritional needs. 3. No, cultural beliefs have no influence on our eating practices.		
27	What most influences children's food choices? 1. =Nutritional value and health benefits of food. 2 = Children's taste preferences and tastes. 3.=Convenience and ease of preparation. 4=available food 5=Others (specify)		
28	What are the visible signs of child malnutrition?		
29	Are there any traditional or local foods considered highly nutritious in in this household? Please describe them.		
30	How are processed and fast food perceived in this household in terms of nutritional value and health implications? 1 good2. Neutral. 3. Bad		
31	What types of food are generally included in your child's daily diet?		
32	Do you provide your child with appropriate portions at mealtimes? 1. Yes, I serve portions adapted to my child's age and appetite. 2. No, I provide adult-sized portions for my child. 3. I am not sure of the appropriate portion size for my child. Information		

33	What sources do you rely on for information on nutrition and eating habits? 1. Radio 2.Newspaper. 3 internet 4ùùMembers of the Community Animation Cells 5 Other (please specify)		
34	Have you heard of or taken part in any Community Animation Cells programs or initiatives relating to child nutrition? 1. yes 2. no No		
35	If so, briefly describe your involvement.		
36	How many times have participated in such outreach in the last 6 months		
37	When was the last Community Animation Cells you attended held?		
38	Have you ever received visitations by CACs (CHW) in this household? 1=Yes 2=No		
39	If yes, how many times in the last 3 months?		
40	What date was the most recent last visitation by CACs (CHW) in this household?		
41	What are activities conducted by CHW in your household during this visitation?		
42	Have you noticed any changes in the nutritional status or eating habits of children under 5 in your household since the Community Animation Cells were set up? 1. Yes, positive changes. 2. No, no change at all 3. I am not sure		
43	If so, what changes?		
44	Has anyone in this household been actively involved in Community Animation Cells activities related to child nutrition? 1; yes 2: no		
45	If so, what activities did they take part in? 1. Workshop. 2. Training sessions, 3. Awareness campaigns		
46	What foods are you used to eating in your household? 1. Staple food 2. Construction food of animal origin 3. Construction food of vegetable origin 4. Protective food		
47	Do you have a vegetable or plot garden? 1; yes 2: no		
48	Do you practice key hand-washing moments? 1; yes 2: no		
49	If so, which vegetables/crops does it contain?		

50	What is the main source of drinking water in your household? 1. Landscaped spring 2. Fountain terminal 3. Tap 4. River 5. Pond 6.Others to be specified.....		
51	Do you think the members of the CACs are useful in support to fight against malnutrition in your household? 1. yes 2. No		
52	If so, explain why you think so (probe for testimonies and experiences in this household)?		
53	Were you involved in choosing the community relays in your village? 1. Yes 2. No		
54	Did you take part in the elections for members of the Community Animation Cells groups in your village? 1.Yes 2. No		
55	Do you have the time to follow what the members of the Community Animation Cells teams are doing in your household? 1.Yes 2. No		
56	Do you think they are fulfilling their roles and responsibilities as CAC members? 1.Yes 2. No		
ANTHROPOMETRIC FORM (make provision all U5s that will be in household)			
57	Date of data collection _ / /		
58	Child's number : _____		
50	Child's gender : 1. M 2. F		
60	Age (months) : _____		
61	Average reading		
62	Height (cm) _____		
63	Weight (kg) _____		
64	PB :		
65	Edema : 1. + 2. ++ 3. +++		
66	**MUAC (G/Y/R)**		

EFFECTIVENESS OF FUNCTIONAL CAPACITIES OF COMMUNITY ANIMATION CELLS ON IMPROVING NUTRITIONAL STATUS AMONG UNDER FIVE IN SOUTH KIVU-DRC

Community: FGD (Tool 2)

N°	Questions
1	What is malnutrition?
2	What are the causes of malnutrition in this community?
3	How do you define the nutritional status of children under 5?
4	Can you describe the main factors influencing the nutritional status of children under five in this community?
5	What is your understanding of breastfeeding in relation to the nutritional status and growth of children under 5?
6	What is your understanding of complementary feeding in relation to a child's nutritional status and growth?
7	How do you see the importance of a child's diet in the first five years of life?
8	Have you heard of the Community animation Cellular (CAC)?
9	What are the activities of the Community Animation Cells teams?
10	How do the Community Animation cells work in this community?
11	What do you think of the way the Community Animation Cells teams operate?
12	To what extent do community members attend and participate in Community animation Cellular (CAC) activities in this community?
13	If so, could you describe the experience and theactivities you took part in?
14	How do you think the CACs are helping to improve the nutritional status of children under five in this community?
15	Do children aged 0-6 months breastfeed exclusively in your community? Give reasons that make this possible or impossible.
16	Children aged 20-24 months who continue to bebreastfed in your community?
17	Do children aged between 6 and 24 months eat an adequate complementary food (at least 3 meals a day and a 4-star ration)?
18	Do children aged 0-59 months attend CPS?
19	Do community workers visit households in this community? If so, what do they do in households during these visitations?
20	In your opinion, are there any specific CAC activities that have a direct impact on children's

	Nutrition in this community? If yes, which ones?
21	Do you think they (CAC) are effective in carrying out community activities to combat malnutrition in children under 5 in your village?
22	What, in your opinion, are the main basic elements that prove this effectiveness?
23	What challenges/obstacles affect the effectiveness of the community coordination unit and CAC work in this community?
24	In your opinion, what more is needed, to improve the effectiveness of the community coordination unit?
25	What additional activities or strategies do you think Community Action Groups (CAGs) could implement to improve the nutrition of children under 5 in the community?
26	How can community members, including household members, actively support and engage with CACs to improve child nutrition?
27	what can you recommend to members of the CACs to strengthen in activities to be more effective in combating malnutrition in children under 5 years of age?

EFFECTIVENESS OF FUNCTIONAL CAPACITIES OF COMMUNITY ANIMATION CELLS ON IMPROVING NUTRITIONAL STATUS AMONG UNDER FIVE IN SOUTH KIVU-DRC

CAC members : Questionnaire (Tool3)

Number	Questions	Insert your answers in this box/part
Demographic data		
1	Age (in years)	
2	Gender 1. Male 2. Female	
4	marital status 1. Single 2. Married 3. Widowed/Separated 4. Separated	
5	Level of study 1. Primary. 2. secondary / high school 3. Tertiary	
6	Occupation 1. Self-employed (specify type of trade) 2. Employed 3. Others (specify)	
7	Monthly income .....(in CF)	
8	Ethnicity	
9	Religion 1. Christian. 2. Muslim. 3. Other (please specify)	
SECTION B		
Knowledge, and perceptions of nutrition		
B1: Recruitment and Training:		
10	When were you recruited as CHW?	
11	How were you selected to be a CHW? 1= I was counted by the village chief 2= I was elected by the village members at the village elective meeting 3 = I was retained on the basis of my leadership 4=Other (please specify)	
12	Have you received any training in this role as CHW?	
13	If yes, how long was the training	
14	And, which one? 1=community strategy 2=Community dialogue. 3=Case management at home. 4=Other (please specify)	
15	Who provided the training? 1=MOH, 2=Partners (specify), 3=FBO, 4=Others (specify)	
16	Other than the first training to make you a CHW, is there any others trainings you receive	

17	When was the last such (refresher) training?		
18	Who provides these refresher training? 1=MOH, 2=Partners (specify), 3=FBO, 4=Others (specify)		
19	Was the training adequate for your work as CHW and CAC? 1=yes 2=No		
B2: Tools and working Aid			
20	What tools and aid have you been provided with for your work? 1 = ministerial notebooks for counting 2 = advice card (good nutritional practice) 3 = prevention framework 4 = reporting framework 5 = screening framework 6 =Others (specify)		
21	Who provided the tools? 1=MOH, 2=Partners (specify), 3=FBO, 4=Others (specify)		
22	How often are they serviced / replenished?		
23	Who services / replenishes them? 1=MOH, 2=Partners (specify), 3=FBO, 4=Others (specify)		
B3: Role and Scope of work			
24	What roles were you taught to perform as a CAC member? 1= Centralization of data collected in the community 2=Organization of meetings to analyze the information collected. 3= Transmission of information to CODEV and CODESA 4=Feedback to the village during general Assembly 5= Develop and implement the community action plan and maintain village works with the participation of all the village's key actors 6= Organize periodic meetings to monitor and evaluate the community action plan 7= Ensure the mobilization of local resources for the implementation of the local development plan (Example: maintenance of water points) 8= Develop and implement local emergency response plans. 9= Ensure the safety of materials and equipment assigned to villages/cells 10= Schedule consultation meetings with the population in the village/cell 11= Others (specify);		
25	Which of these roles were you trained in? 1=Raising awareness of good eating habits in households with children under 5 years of age 2= Active screening at community level 3 = home visits 4=Registration of children with the Civil Registry		

	5=reporting of community activities 6=Identification of children suffering from malnutrition 7= Others (specify);		
26	How many households are you assigned as a CAC member?		
B4: Nutrition knowledge			
27	How often should a child be breastfed each day? 1. on demand, whenever the baby shows signs of hunger. 2. Every 4 hours. 3. Every 6 hours. 4. Every 8 hours		
27	What is the recommended age for introducing semi- solid foods into an infant's diet? 1. around 6 months 2. As soon as the baby is born. 3. 2 months old 4. 1 year old		
28	Can breastfeeding continue even after the introduction of solid foods? 1. Yes, breastfeeding should continue alongside solid foods until at least 2 years of age. 2. No, breastfeeding should stop once solid foods have been introduced. 3. Only if the baby refuses solid food 4. Only if the mother wants to continue	.	
29	What is a balanced diet? 1) A variety of foods from all the food groups in appropriate proportions. 2. Foods from a single food group. 3. Foods high in sugar and fat 4. Any type of diet is considered balanced		
30	What are the main elements / components that make up a balanced diet? 1. at least 3 dairy products per day 2. meat, fish or eggs 1 or 2 times a day 3. at least 5 servings of fruits and vegetables per day 4. starchy foods at each meal: bread, cereals, potatoes or pulses 5. fats such as oil or butter should be limited 6. drink water, the only essential drink, as much as you like		
31	How many times a day should a child eat? 1. Less than two meals. 2. Two to three main meals. 3. More than three times a day. 4. As required, depending on the child's hinder and appetite	.	
32	What are the visible signs of child malnutrition? 1= not growing or putting on weight at the expected rate (faltering growth) 2= changes in behavior, such as being unusually irritable, slow or anxious 3= ow energy levels and tiring more easily than other children 4=oedema 5=Others (specify)		
33	What do you do if you detect a case of malnutrition in a child under the age of 5? 1= we will take him to the nearest health facility 2 = we take care of them at community level 3 = we reiterate nutritional advice to parents 4 = we encourage the consumption of balanced foods1= 5 = Others (specify)		
34	What are key actions that you were trained in to help households provide balanced diet for their children 1= assessment of household situation 2=planning for nutrition access,		

	3=training on food preparation, 4=training on food storage 5=training on child feeding 6=Others (specify)		
B5: Technical support, Motivation, etc			
35	How are you supported in your work? 1= Through support for the running costs of partners in the health zone 2= Through financial incentives for routine activities (e.g. vaccination) 3=Through the provision of certain work tools by the health zone central office 4= Others (specify)		
36	When was the last time you received the following support in your work as CAC? 1= operating costs 2=provision of income-generating activities 3=provision of market garden seeds 4=management tools at community level (registers, prevention plans, etc.), 5=Provision of work equipment (boots, cases, impermeable, etc 6= Others (specify)		
37	According to charter, who is supposed to support you in your work? 1=MOH, 2=Partners (specify), 3=FBO, 4=Others (specify)		
38	Whom have ever received any support from? 1=MOH, 2=Partners (specify), 3=FBO, 4=Others (specify)		
39	When was the last time you received support from? 1=MOH, ---------- 2=Partners (specify), ---------- 3=FBO, ---------- 4=Others (specify) ----------		
40	Is this support sufficient? 1=Yes 2=No		
C: Practice			
41	How long have you been practicing as a CHW? .....(in years)		
42	How many households do you cover in your CAC work?		
43	What role(s) do you play as CAC? 1= Implement and monitor decisions made 2= Participate in planning nutrition and health actions in the village/neighborhood 3= Mobilize local ressources 4= Organize the population census and identify vulnerable		

	populations (pregnant and breastfeeding women, malnourished children, etc.) 5= Coordinate nutrition and development actions in the village: 6= Organize periodic community meetings on the results of community weighings and on practices to promote or solutions to problems identified by the CACs 7= Write and transmit reports to CODESA. 8 = Others (specify)		
44	As CAC member, what are your routine activities to promote nutrition in your households of coverage and the community? (list key ones from charter for ticking as they are mentioned) 1 = promotion of AICF and other WEPs (optimal breastfeeding, complementary feeding, use of ORS+Zn in case of diarrhoea, hand washing, 2 = use of insecticide-treated mosquito nets and recourse to health services in the event of danger signs), community weighing, distribution of multi-micronutrients, etc, 3 = distribution of micronutrients, 4 = vaccination of children and pregnant women 5 = iron and folic acid supplements for pregnant and breast-feeding women, 6 = distribution of insecticide-impregnated mosquito nets, distribution of ORS+Zn sachets and 7 = systematic screening by PB and referral for the management of acute malnutrition, 8 = promotion of food security actions, 9 = promotion of income-generating activities (IGA), 10 = promotion of water, hygiene and sanitation activities, etc. 11 = Organising monthly meetings of the CACs to discuss progress made, problems encountered with regard to the quality and performance of community activities and obstacles to the promotion of selected priority practices. 12= active screening for children under 5 in the community 13 = managing cases of child malnutrition 14 = Others (specify)		
45	What motivates you as a volunteer in carrying out CAC activities?		
46	How many times a month do you go out into the community to raise awareness of nutrition in households? 1. more than once a week 2.once a week 3. Once every fortnight 4. Once every three weeks		
	What if any, information system, do you have and use to serve the households you are allocated? 1=Household register 2=Logbook 3=Others (specify)		
	How often do you visit a household with an U5 year old?		
	How many times in total per year do you visit such a household?		
	When was the last such visitation?		

	During this last visit, what activities did you carry out in that household? (list all from 44 above, to tick each that will be mentioned)		
47	Do you write reports on what you do for the community? 1. yes 2. no No		
48	If so, where do you file your reports?		
49	How often do you record your reports? 1. on a daily basis 2. Weekly 3. Monthly 4. Quarterly 5. Yearly 6	.	
50	In your opinion, how effective a Community Animation Cells in improving the nutritional status of children under 5 in this community? 1. Very effective. 2. Rather effective. 2. Not effective. 3. Not sure		
51	Have you noticed any changes in the nutritional status or eating habits of children under 5 in your household or community since the Community Animation Cells were set up? 1 Yes, positive changes. 2. No, no significant change. 3. I am not sure		
51	If so, what changes?		
52	Do you feel your participation and role in nutrition improvement is appreciated by other partners? 1. yes 2. no No		
53	What is t. he attitude of members of the community towards the CAC's activities in the region? 1. Very bad 2. Very bad 3. Neutral 4. Good 5. Very good		
D. FACTORS			
54	Do you receive any renumeration for what you do for the community? 1. yes 2. no No		
55	If so, from whom? 1 Government of the DRC. 2 NGO/Donor. 3. Community. 4. Other (please specify)		
	When was the last time you received such renumeration?		
56	Does the community appreciate your work? 1. Yes 2. No		
57	If so, how does the community value your work? 1.by thanking you after serving them. 2. Tokens, chicken, food. 3. Cash payment. 4. Community recognition. 5. Other specified		
58	Does the community recognize the services you offer? 1. Yes 2. No		
59	How many households do you cover every day?		
60	How do you move from one home to another? 1.on foot 2. By bike 3. Motorbike 4. Vehicle		
61	Are there any challenges you face in your work as CAC? 1=Yes 2=No		
61	If yes, what challenges do you face in your work to promote nutritional practices?		
Level of CAC effectiveness			
61	Would you say you are effective in your role as a member of the CAC in the fight against malnutrition in children under 5 in this community? 1. Yes 2. No		

62	If yes, on the basis of which elements do you consider yourself to be effective in the fight against malnutrition in children under 5 in your health area?		
63	Do you hold regular meetings on malnutrition in children under 5? 1. Yes 2. No		
64	If so, how many times do you meet each year?		
65	How are you mobilising local resources to combat malnutrition in children under 5?		
66	How are you organising the population census and identifying vulnerable groups (pregnant and breast-feeding women, malnourished children, etc.)?		
67	As a member of the CAC, tick off the different responsibilities you have performed with effectiveness in your village ? (list all from 44 above, to tick each that will be mentioned) 1.		
68	Beyond the answers given above, what do you think can be done to make yourself more effective and functional in improving the nutritional status of children under 5 in your village?		

EFFECTIVENESS OF FUNCTIONAL CAPACITIES OF COMMUNITY ANIMATION CELLS ON IMPROVING NUTRITIONAL STATUS AMONG UNDER FIVE IN SOUTH KIVU-DRC

CAC members : Focus Group Discussion (FGD) (Tool4)

Questions	Insert your answers in this box/part
A: Role and Scope of work 1. In your views, who is a CAC member? 2.What are the roles of a CAC member? 3. What makes CACs ideal for the role they have been assigned? 4. Comment on the recognition of CACs by: 4(a) Government (MOH) 4(b) Partners and FBOs 4(c) Community in which you serve 5. What recommendations, if any, do you have to making the authority CAC formal and respected? B1: CAC Capacity (Knowledge, and perceptions of nutrition) Training: **5.** Have you received any training in this role as CHW? **6.** Which of your roles have you been trained on? **7.** How long was the initial training to graduate you into a CHW? **8.** Who trained you? **9.** In your opinion, how adequate was this training in performing your expected CAC roles? **10.** What recommendations, if any, do you have to making the training more useful to your work? B2: Nutrition knowledge **11.** Can breastfeeding continue even after the introduction of solid foods? **12.** What is a balanced diet? **13.** What are the main elements / components that make up a balanced diet? **14.** What are the visible signs of child malnutrition? **15.** What factors affect a household's ability to provide balanced diet for the U5s in this community? **16.** Whom do you work with in the households? And explain why them? **17.** What are the key elements were you trained in to help households provide balanced diet for their children; **18.** Comment on the adequateness of the nutrition training for you to provide support to households **19.** What recommendations, if any, do you have to make the nutrition training more useful to your work? C: Tools, CAC Kitty and working Aid **20.** What tools and aid have you been provided with for your work? **21.** Who provided the tools to the CACs? **22.** Are the tools services / replenished regularly?	

23. By whom? **24.** Comment on the adequateness of these material to facilitate you conduct all assigned work **25.** What recommendations, if any, do you have to make the material adequate for your work? B5: Technical support, Motivation, etc. **26.** what type of support do you receive to carry out your work well and who is this from? **27.** As CAC member, what are your routine activities to promote nutrition in your households of coverage and the community? (Probe based on list key ones from charter) **28.** In your opinion, how effective are Community Animation Cells in improving the nutritional status of children under 5 in this community? (Probe for testimonies) **29.** What difficulties do you often encounter in the performance of your duties? (Probe for testimonies) **30.** Do you receive any renumeration for what you do for the community **31.** Beyond the answers given above, what do you think can be done to make CAC more effective and functional in improving the nutritional status of children under 5 in your village?	

THANK YOU FOR YOUR PARTICIPA

EFFECTIVENESS OF FUNCTIONAL CAPACITIES OF COMMUNITY ANIMATION CELLS ON IMPROVING NUTRITIONAL STATUS AMONG UNDER FIVE IN SOUTH KIVU-DRC

Government services: Policy and management level (KII Tool 5)

N°	Guiding Themes
A: Policy and legal framework	
1	What is the legal structure of the CACs at central level in the fight against malnutrition?
2	Comment on the appropriateness of the current CAC legal structure in making it effective regarding national and zonal integration in planning, financing and coordination.
3	What success stories would you say have so far been reported of the policy and legal framework of CAC program?
4	What challenges, if any, do you feel should be addressed policy and legal wise to strengthen implementation of CAC program in the country?
B: CAC Program Implementation	
5	Is there a formal CAC program implementation guideline?
6	If existing, comment on the availability of the guideline to all frontline technical staff including the CHWs.
7	What are the key issues addressed in the guideline?
8	Comment on the level of implementation of the guideline in the implementation of CAC initiative.
9	Provide success stories / testimonies of which areas of the guideline that have been effectively implemented.
10	Which areas of the guideline have not been effectively implemented? Explain with examples of failures.
11	Comment on implementation or lack of implementation of key enabling factors as envisioned in the policy guidelines for effective functioning of CAC (in each case probe for testimonies for evidence and reasons).
12	Who is in charge and direct supervisor of CAC?
13	Comment on their capacity to effectively provide adequate and quality technical support to the CACs (probe on their training, capacity to train and identification of gaps and refresher train CAC, monitor, supervise and provide feedback for continuous improvement of work of CACs, influence positively, innovatively address challenges faced by CACs, etc) in the role to improve nutrition of children under 5 years old.
14	Comment on the effectiveness of the CAC motivation package to make the work of the CACs more viable in the prevention and community management of malnutrition in children under 5?
15	What are the strategic guidelines for support or funding at operational level that you define at central level in the development of the CAC approach in the fight against malnutrition in children under 5?
16	Comment on the successes of activities that CACs are involved in the community to improve children's nutrition ?
17	Comment on the challenges or failures of activities that CACs are involved in the community to improve children's nutrition ?
18	From your point of view, what are the main challenges or obstacles encountered by the Community Action Units (CACs) in effectively combating child malnutrition ? (Probe for: Knowledge, attitude and skills for expected roles, legal framework, resources for activities, motivation, etc)

19	Comment on the extent of multisectoral coordination with other social sectors involved in promoting nutrition and other areas in strengthening the performance of CAC?
20	In your opinion, how can community members, including households contribute to functioning of Community Action Groups (CACs) to improve child nutrition in the community? (Probe for: roles of engagements, resources mobilization for activities, motivation of CACs, etc)
21	In your opinion, how can partners contribute to functioning of Community Action Groups (CACs) to improve child nutrition in the community? (Probe for: their role on Knowledge, attitude and skills for CACs expected roles, legal framework, resources for activities, motivation, etc)
22	How often does the community development team meet?
23	Who takes part in the meetings organized by the community coordination unit ?
24	In your opinion, what additional activities or strategies should be implemented by the Community Animation cells (CAC) to further improve child nutrition ?
25	What support or resources do you think CACs need to maximise their impact on child nutrition?
26	What are your final recommendations to make CAC functional for improved nutrition for children under 5?

Government services : Operational level (Tool 6)

N°	Guiding Themes
A: Policy and legal framework	
1	Is there a formal CAC program implementation guideline?
2	If existing, comment on the availability of the guideline to all frontline technical staff including yourself and the CHWs.
B: CAC Program Implementation	
3	What are key activities that your unit is involved in in the implementation of CAC program? (*probe on their training, capacity to train and identification of gaps and refresher train CAC, information system, monitoring, supervise and provide feedback for continuous improvement of work of CACs, influence positively, innovatively address challenges faced by CACs, etc)*
4	Are these activities integrated in your annual work plan and budgets?
5	If yes, provide examples of these activities in the current year's plan (ask for copy of annual plan and verify)
6	Comment on the level of implementation of these activities in the implementation of CAC initiative, including reasons enabling successes in this area.
7	Provide success stories / testimonies of which activities have been effectively implemented.
8	Which areas of the activities have not been effectively implemented? Explain with examples of failures including reasons for failure.
9	What key enabling factors do you work on to make the work of CAC functional for nutrition improvement for children?
10	Comment on implementation or lack of implementation of these key enabling factors for effective functioning of CAC *(in each case probe for testimonies for evidence and reasons).*
11	Who is in charge and direct supervisor of CAC?
12	Comment on their capacity to effectively provide adequate and quality technical support to the CACs *(probe on their training, capacity to train and identification of gaps and refresher train CAC, monitor, supervise and provide feedback for continuous improvement of work of CACs, influence positively, innovatively address challenges faced by CACs, etc)* in the role to improve nutrition of children under 5 years old.
13	Comment on the effectiveness of the CAC motivation package to make the work of the CACs more viable in the prevention and community management of malnutrition in children under 5?
14	Who supports and funds your support work to the CAC program in this area? (Probe for national government MOH, FOBs, development partners, etc)
15	How long has each support mentioned above been provided?
16	Comment on the adequateness of the support, from which partners and for what elements?
17	Comment on the successes of activities that CACs are involved inthe community to improve children's nutrition? *(in each case probe for testimonies for evidence).*
18	Comment on the challenges or failures of activities that CACs are involved in the community to improve children's nutrition? (*in each case probe for testimonies for*

	evidence).
19	From your point of view, what are the main challenges or obstacles encountered by the Community Action Units (CACs) in effectively combating child malnutrition?
20	In your opinion, how can community members, including households contribute to functioning of Community Action Groups (CACs) to improve child nutrition in the community?
21	In your opinion, how can partners contribute to functioning of Community Action Groups (CACs) to improve child nutrition in the community?
22	How often does the community development team meet?
23	Who takes part in the meetings organized by the community coordination unit ?
24	In your opinion, what additional activities or strategies should be implemented by the Community Animation cells (CAC) to further improve child nutrition?
25	What support or resources do you think CACs need to maximize their impact on child nutrition ?
26	What are your final recommendations to make CAC functional for improved nutrition for children under 5?

Technical and financial, donors and others Nutritional: KI (Tool7)

N°	Discussion Themes
A: Specific to the organization	
1	Have you played any role in supporting implementation of CAC in DRC,
2	If yes, for how long have you (your organization) been involved in CAC implementation?
3	What experience do you have in supporting or accompanying CACs?
4	What has been your specific role that your organization played in the implementation of CAC?
5	What are your achievements in your roles to support implementation of CAC?
6	How have these achievements contributed to effectiveness and impact of CAC program in DRC and this area?
B: Opinion on overall implementation of CAC program	
7	How do you assess the activity packages of the CACs in improving services aimed at promoting the nutritional status of children under 5?
8	Comment on the appropriateness of these packages for all communities in the DRC.
9	What recommendations would you give to those implementing CAC programs to make them more effective?
10	Comment on the adequateness of the CAC establishment (Community mobilization, CAC structure and members recruitment, training, tooling, etc), development and implementation (motivation, refresher training, kits replenishment, monitoring, supervision and technical support)
11	What do you think of the effectiveness of Community Animation Cells in improving the nutritional status of children under 5 in DRC?
12	Can you share with us some basic elements or testimonies that prove the effectiveness or lack of Community Animation Cells in improving the nutritional status of children under 5?
13	What recommendations can you share to improve the effectiveness of CACs?

THANK YOU FOR YOUR PARTICIPATION.

APPAENDIX III. REPORTING TEMPLATE FOR MONITORING THE ACTIVITIES OF CACS BY ECZS, CAC(CDC), CODESA

	REPORT ON ECZS(1), CS(CDC)(2), CODESA(3) MONITORING OF CAC ACTIVITIES												
	Health zone:							**Number of support groups :**		**Number of functional GS**			
	Number of existing CACs:							***No. of functional CACs:***					
	Reporting period:							***Workforce RECO:***	**M**	**F**	**Tot**		
	Date sent							***RECO Assets:***	**M**	**F**	**Tot**		
	Total population	H		F		Total		***Number of households***	Enter	Outputs	Total		
	Children < 5 years	Boy		Girl		Total							
		Indicators						**Target/Perform ance**	**Targets Expected**	**Targets reached**	**% reached**		
	NUTRITION	Children aged 0-6 months who are exclusively breastfed						**80%**					
		Children aged 20-24 months who are continuing to breastfeed						**80%**					
		Children aged between 6 and 24 months who eat a suitable complementary food (at least 3 meals a day and a 4-star ration)						**50%**					
		Children aged 6 -59 months with PB > 125 mm						**80%**					
		Pregnant and breastfeeding women who have received a 4-star diet (frequency and varieties)						**80%**					
		Children aged 0-59 months attending CPS						**80%**					

	HEALTH	Pregnant women who have had at least 4 ANC visits	**80%**			
		Children aged 0-59 months with diarrhoea treated at home with ORS+zinc	**80%**			
		Children aged 0 - 11 months fully vaccinated	**80%**			
		Children under 5 sleeping with MILD	**80%**			
		Households informed about voluntary HIV testing	**80%**			
	EHA	Households with drinking water in closed containers	**80%**			
		Households with hand-washing facilities using soap/ash	**80%**			
		Households with access to and use of hygienic and safe latrines	**80%**			
	PRORECTION	Households with access to and use of hygienic and safe latrines	**3/10**			
	EDUCATION	Households where all school-age children remain at school during the school year	**80%**			
	FOOD SAFETY	Households with at least one market garden	**60%**			
	GENRE	CAC with at least 30% women	**100%**			
	CAC	CAC with Income Generating Activities (IGA)	**100%**			
		CAC with community garden	**100%**			
		CAC with community small livestock farming	**100%**			
		Household with plot garden	**80%**			
		Household with small livestock	**80%**			
			Assessment/verification/statistics			
		Maintain village works with the participation of all the active members of the villages/CACs in the health area.				

	MONITORIN G AND COORDINAT ION	Drawing up/assessing the SA's consolidated community action plans, validated by the members of the CACs, the village chiefs and the CDC (availability of CAPs)	
		Monitoring the implementation of consolidated community action plans at health area level	
		Participate in/ensure the mobilisation of local resources for the implementation of consolidated local development plans at health area level	
		Ensure the safety of materials and equipment assigned to villages/CACs, CODESA and CDCs	
		Number of visits organised to CACs/villages in the health area to monitor community activities	
		Ensure that consultation meetings are held with the population in the health areas (report on village/CAC meetings)	
		To coordinate communication activities and the promotion of practices conducive to health, nutrition, development and protection in the health area.	
		Coordinate the activities of the CACs, CODESAs and CDCs on the Community LDC	
		Enumeration/identification of the population in each health area/ADVs in health areas	

RECOVERY PLAN

Problems identified	Population census/identification	**Responsible for the action**	**Deadline**	**Person responsible for monitoring**

Other details to be specified:
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Name and signature

APPENDIX: IV. OUTLINE OF THE REPORT ON THE SUPERVISION OF THE ACTIVITIES OF THE CACS BY THE BCZS, BY THE CS (CDC) AND BY THE CODESA.

REPORT ON THE SUPERVISION OF CAC ACTIVITIES BY THE BCZS (1), CS (2), CODESA(3)

Health area : Health area :

Supervision period: .....

Reporting date: .....

Number of CACs: ..... Number of functional CACs:……..

Number of RECOs: ..... Number of active RECOs:……

Health and safety context of the health zone.

Security situation (with facts)	Health situation (with facts and statistics)

Priority activities

Audit indicators

- **Existence of management tools (list available and usable tools)**

- Prevention and promotion activities relating to nutrition and other essential family practices carried out by the various health area coordination units.

- **Assessment of CAC activities in the community**

1. Positive points

. Areas for improvement

• Support measures proposed by the CDC and the health zone

- **Assessment of CAC activities through CDCs and CODESAs**

- **Positive points**

- Areas for improvement

- Support measures proposed by the CDC and the health zone

- Filing of CAC reports at health centre level (to ensure that they are properly filed in accordance with minimum standards),

- The players involved in each CAC and their specific activities

Indicative table of stakeholders in the health area (in all villages)

N°	Players (name and acronym)	Activities carried out in the CACs/villages

Follow-up to recommendations

Recommendations followed	Level of attainment (% estimate with CDC)	Comments

Difficulties encountered and proposed solutions (recommendations)

RECOVERY PLAN			
Problems identified	**Actions to be taken**	**Responsible for the action**	**Deadline**

Other details to be specified:

Let's conclude

....., .../...../20..

APPENDIX: VI. REPORT OF THE EVALUATION OF THE COMMUNITY ACTION PLAN OF THE C.A.C ETATS- UNIS OF 3 MONTHS OF RESEARCH, held on 15/05/2024.

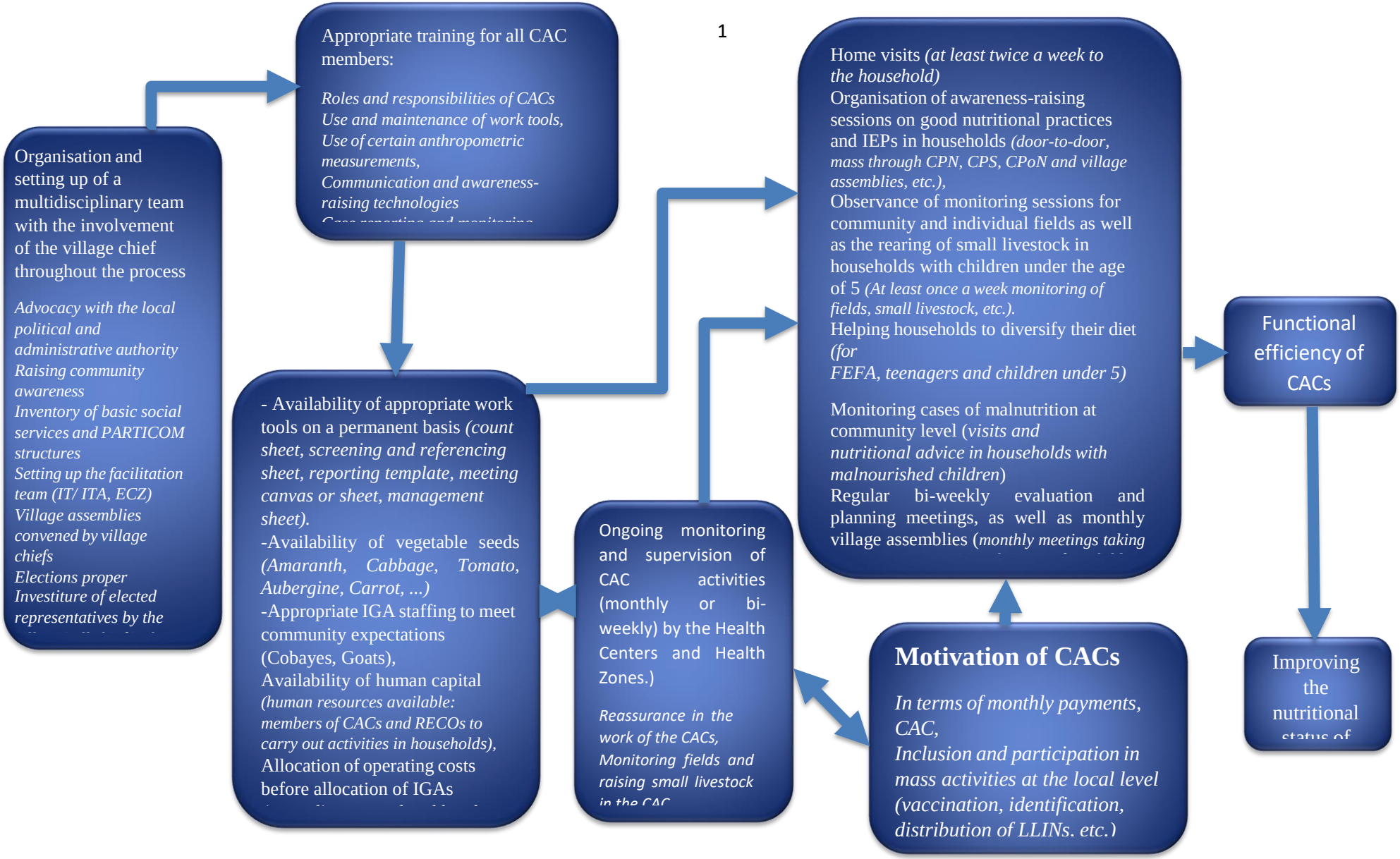
N°	PRIORITY PROBLEM	EXPECTED RESULT	ACTIVITY	RESOURCES	PERIOD	FOLLOW-UP	SCORE	COMMENT
01	Low attendance of pregnant women at the ANC	90% of pregnant women attend ANC and drink the drugs	Identifying pregnant women VAD	RECO, C.A.C, cards, Pens	1 week	C.AC RECO	7/10	He should even go to the neighbouring CS to see how many people attend the ANC there in Muoma to be reassured.
02	Non-compliance with breastfeeding standards for children of O-6 and 6 to 23 months	90% of women breastfeed and respect exclusive breastfeeding from 0-6 months	Raising awareness Follow-up VAD Identification	RECO C.A.C. Identification register, sheets	2 First weeks of the month	RECO CAC Village	6/10	Identify children by age group and follow up.
03	Non-attendance at the CPS at the CS	90% of women or fathers bring their children to the CPS and comply with the vaccination schedule.	Screening Referencing Identification Mail order and follow-up	RECO, C.A.C, CS Muac, weighing machine, image drinker, registers, cards, toise, pen	4 times a month and at any time as required	CAC RECO CS	8/10	The advanced quote method is the right one because it makes it easier to have 4 or 5 children.
04	Water-borne diseases	90% of the population Drink water More or less 80% of the population Practice the 5 moments of hand washing and do not use or frequent the iver (indoor water)	Development of drinking water sources (construction of standpipes) Washing instructions for tomorrow.	RECO, CAC, Partner, sand, cement, hoe, hand washer, ash, soap, stone, tap, valve, spade, planchette, voice,...	More or less one year	CAC BCZS Village	8/10	Advocate to the various partners, as this requires funding and community participation.

05	Adequate hygienic latrines.	At least 75% of households use hygienic latrines and manage the faeces of children under 59 months old.	Construction of a latrine Construction Follow-up	Village chief - Sheet metal, straw, rafters, nails, boards, CAC, RECO.	Plus or minus 6	RECO, CAC Village The State	7/10	Put the hand washer on the latrine and the soap in the ash and also cover the toilet hole.
06	Weak schooling for children	90% of school- age children attend school Around 70% of children aged between 36 and 59 months attend nursery school	Counting children not attending school Orientation Follow-up Construction The nursery school	RECO, CAC, Partenair, Che de village, EPST Subdivision - Plot, equipment required	Plus or minus 6 months More or less one year	RECO, CAC De village, Head of establishment , EPST.	5/10	These children must be identified.
07	Fruit trees	More or less 80% move to a fruit tree and eat the fruit	Planting fruit trees Distribution and monitoring	RECO, CAC, Plantiel, field	More or less one year	CAC RECO	5/10	At least every household should have one or 2 fruit trees
08	Poverty	More or less 75% of households have IGAs	Creation of the MUSO, WITH Small livestock farming	RECO, CAC, chicken, turkey, rabbit, goats,...	Plus or minus one month	CAC, RECO, Village chief	5/10	Everyone can get involved in the activities of the group.
09	Civil status	100% of children are registered.	Identification of unregistered children Orientation Follow-up	RECO, CAC, Civil Status	Every month	CAC, RECO, Civil Registrar	6/10	Contact the ACAD organisation to help register these children at different ages.
10	Path	Fitting out	- Salongo	RECO, CAC, Pop. Hoe, machete, spade,...	Once a week	Village chief CAC	8/10	The awareness of all a cahcun lor construction to let the passage.
11	Attendance at the Pirate Health Centre	85% of the population do not use the pirate health post.	Promoting and raising awareness among the general public.	CAC,RECO, village, CS.	3 months	CAC, RECO, CS and BCZS	6/10	Avoid frequenting this post where there are no quality nurses and even medicines that are not suitable (pirate).

APPENDIX: VII. EVALUATION REPORT ON CAC NYABIKULBA'S COMMUNITY ACTIVITY PLAN FOR FEBRUARY TO APRIL 2024

N'	PRIORITY PROBLEM	RESULT HEARD	ACTIVITY	MATERIAL, FINANCIAL AND HUMAN RESOURCES	PERIOD	PERSON RESPONSIBLE FOR MONITORING	SCORE	ARGUMENTATION ;COMMENTARY
1	Low production of plant-based energy foods	Increase in the production of energy foods 90% of the production of energy foods	Market gardening - setting up a community field ; vegetable or plot gardens	CAC ; the community ; seeds ; farming tools ; crop protection tools	3 to 6 months	CAC; CODESA; CAC president	5/10	this score of 5/10 because the members of the CAC the sensitizations and certain households practise the lessons the others not; because they declare not to have a large plot; the others make their garden but with the divagation of animal damages them in more of that the other members accuse their financial means to this to get food with 4 stars
2	Early weaning of children under 6 MONTHS of age	Promoting exclusive breastfeeding	Door-to-door awareness-raising and focus groups for breastfeeding women and their husbands	CAC and RECO members	Immediate	CODESA	9/10	The community has testified that the members of the CAC and RECO have raised awareness about exclusive breastfeeding of children from 0 to 6 months; and the FAs are practising it, giving nothing but breast milk to show that the lesson has been well learnt.
3	Weak supply of 4-star meals in the community	80% of households consume 4 - star foods	VAD; raising awareness and culinary demonstrations	CAC, RECO, CDC and the immage box	3 months and ongoing	CODESA	5/10	The community confirmed that awareness-raising on the consumption of the 4-star meal was well done and even the culinary demonstration that they had never seen was done despite the lack of financial means to totalise the 4 stars on a single day for some households; they declared that with the awareness-raising done the majority of the population will have

								their² plot garden and livestock.
4	Low awareness among ANJE and PFE graduates	85% of community members are aware of the ANJE an d PFE promotions	Organising VADs and raising awareness on various themes	CAC and RECO	3 months and more	CODESA	7/10	The CAC has found it useful to raise awareness of different themes among the members of the ANJE support group, which is why 3 ANJE support groups have been set up during this research period. These support groups are made up of FEFAs, childminders and heads of household to share different experiences and themes.
5	Poor identificatio n of the village population	The population is identified	Organisation of monthly village counts by RECOs	RECO;CAC members;enume ration registers;enumer ation summary sheets;sc reening sheet;marker pen	Immedia te and regular	CDC; CODESA and IT	9/10	The CAC's RECOs have been carrying out regular monthly counts since the start of this research; in their past, counts were carried out once a year or during the organisation of the impregnated mosquito net distribution campaign; at present, counts are carried out regularly.
6	Low production rate of protein-rich foods	80% increase in protein-rich food i n Nyabikumba village	Small livestock farming /Cobaye	Contribution from each CAC member and a donation from a partner if possible	3Month s and continuo us	CAC; CODESA and village chief	8/10	The vision of the CAC towards this problem of increasing the production of food rich in protein is to sensitize the community on the breeding of small livestock (guinea pigs and others) the CAC had a donation from the AGR;cobayes which they distributed according to their vision and strategy so that each household having children from 0 to 59 Months that they raised of the cobayes and others thus to fight against malnutrition in the village; after this they is worth each end of the month to pass in each household profiting from the cobayes for the good statistics and to implement their vision

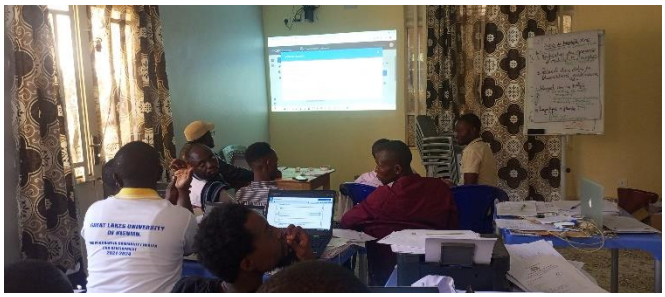


APPENDIX: VI*II. Fig 4.2. Factors in the functional effectiveness of CACs in improving the nutritional status of children under 5 years of age from participant observation during the intervention (results Doris BH, 2024). (More descriptive)*

APPENDIX: IX. IMAGES TAKEN THROUGHOUT THE INTERVENTION PROCESS (FOLLOW-UP OF THE COHORT CONCERNED BY THE INTERVENTION)

Family photo (after training, handover of equipment and supplies)

At the village assembly/community animation cell USA/ZS Bunyakiri-Sud-Kivu.



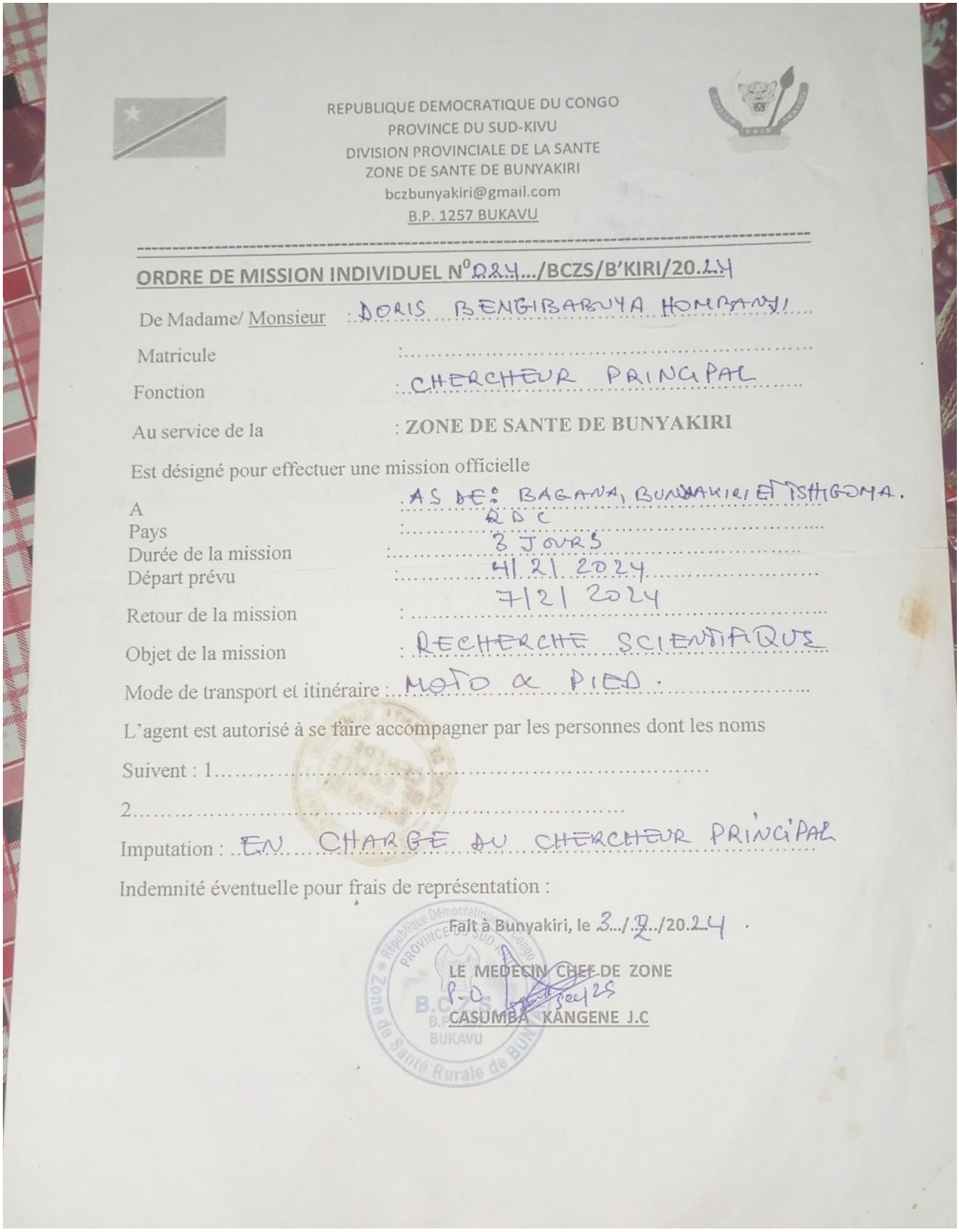
Training of interviewers and supervisors on data collection tools and survey preparation

family photo after visiting activities (community fields, working with tools, understanding the intervention process) at CAC Nyabikumba in the Tshigoma health area.

Evaluation by the principal investigator of the intervention process with the members of CAC Etats-Unis, in the presence of the community dynamics officer of the Bunyakiri health area, the President of CODESA, the Community Animator of the Bunyakiri health area, a research supervisor and a research supervisor.

Observation visit by the principal investigator of a community field in favor of households with children under 5 years of age in Village Etats-Unis.

APPENDIX: X. MISSION ORDER FOR DATA COLLECTION FACILITATED BY THE HEALTH ZONE CONCERNED BY THE STUDY.



REPUBLIQUE DEMOCRATIQUE DU CONGO
PROVINCE DU SUD-KIVU
DIVISION PROVINCIALE DE LA SANTE
ZONE DE SANTE DE BUNYAKIRI
bczbunyakiri@gmail.com
B.P. 1257 BUKAVU

ORDRE DE MISSION INDIVIDUEL N°024.../BCZS/B'KIRI/20.24

De Madame/ Monsieur : DORIS BENGIBABUYA HOMBANYI

Matricule :

Fonction : CHERCHEUR PRINCIPAL

Au service de la : **ZONE DE SANTE DE BUNYAKIRI**

Est désigné pour effectuer une mission officielle

A : AS DE: BAGANA, BUNYAKIRI ET TSHIGOMA.
Pays : RDC
Durée de la mission : 3 JOURS
Départ prévu : 4/2/2024
Retour de la mission : 7/2/2024
Objet de la mission : RECHERCHE SCIENTIFIQUE
Mode de transport et itinéraire : MOTO & PIED.

L'agent est autorisé à se faire accompagner par les personnes dont les noms

Suivent : 1.....

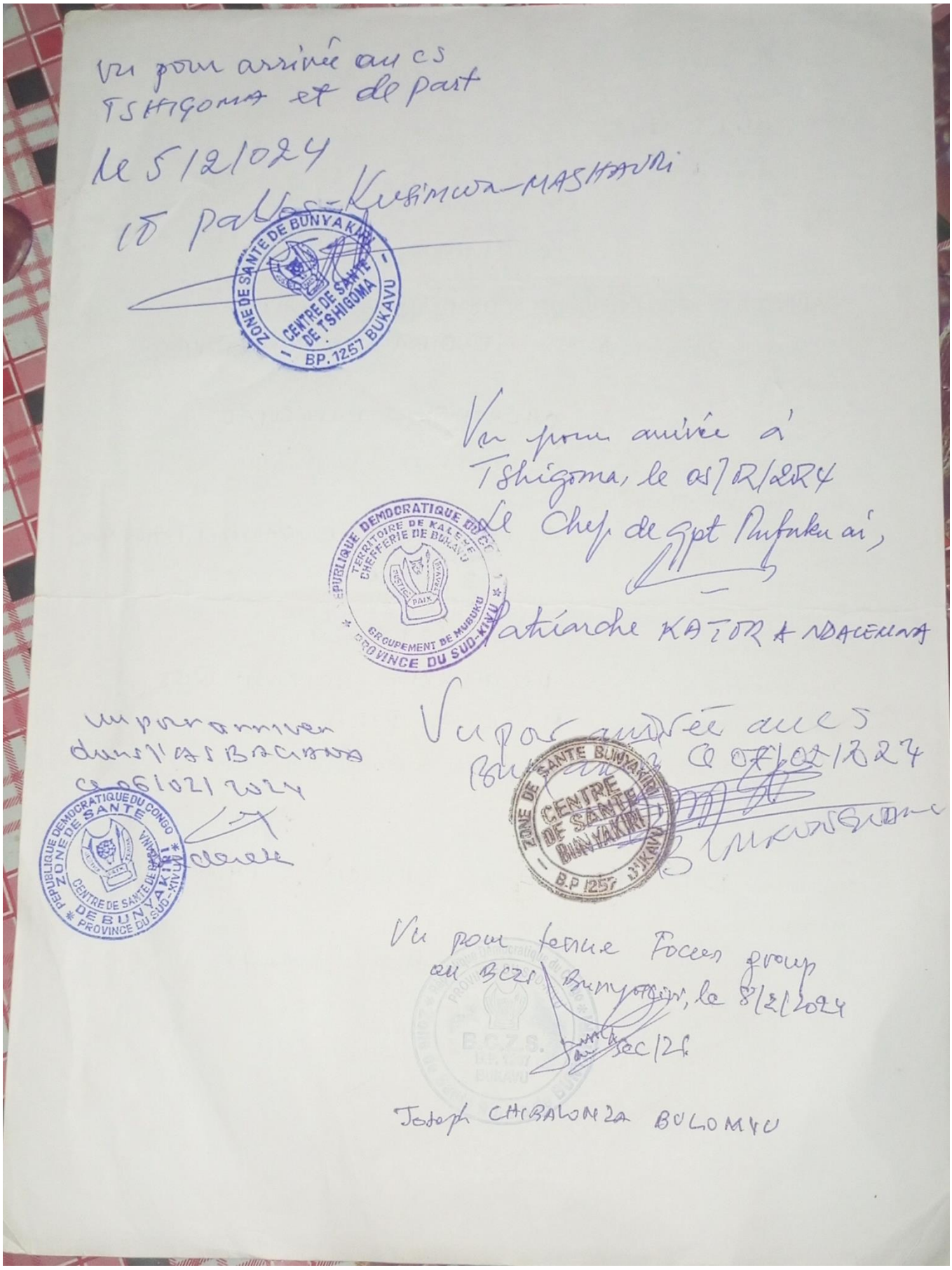
2.....

Imputation : EN CHARGE DU CHERCHEUR PRINCIPAL

Indemnité éventuelle pour frais de représentation :

Fait à Bunyakiri, le 3../2../20.24

LE MEDECIN CHEF DE ZONE
P.O.
CASUMBA KANGENE J.C



Vu pour arrivée au CS
TSHIGOMA et de part
le 5/2/2024
Le Pas-Kusimwa-MASHAURI

ZONE DE SANTE DE BUNYAKIRI
CENTRE DE SANTE DE TSHIGOMA
BP. 1257 BUKAVU

Vu pour arrivée à
Tshigoma, le 05/02/2024
Le Chef de Gpt Bufaka ai,
Patriarche KATORA NDACEMA

REPUBLIQUE DEMOCRATIQUE DU CONGO
TERRITOIRE DE KALEHE
CHEFFERIE DE BUKAVU
GROUPEMENT DE MUBUKU
PROVINCE DU SUD-KIVU

Vu pour arrivée au CS
Bunyakiri ce 07/02/2024

ZONE DE SANTE BUNYAKIRI
CENTRE DE SANTE DE BUNYAKIRI
B.P 1257 BUKAVU

Vu pour arriver
dans l'AS Bacumbu
ce 06/02/2024

REPUBLIQUE DEMOCRATIQUE DU CONGO
ZONE DE SANTE
CENTRE DE SANTE DE BUNYAKIRI
PROVINCE DU SUD-KIVU

Vu pour tenue Focus group
au BCZS Bunyakiri, le 8/2/2024
Sec/ZS

B.C.Z.S.
BUNYAKIRI
BUKAVU

Joseph CHIBALONZA BULOMVU

APPENDIX: XI. FORM CONFIDENTIALITY UNDERTAKING FORM

CONFIDENTIALITY UNDERTAKING FORM

Effectiveness of the functional capacities of community animation cells in improving the nutritional status of children under five in South Kivu, DRC

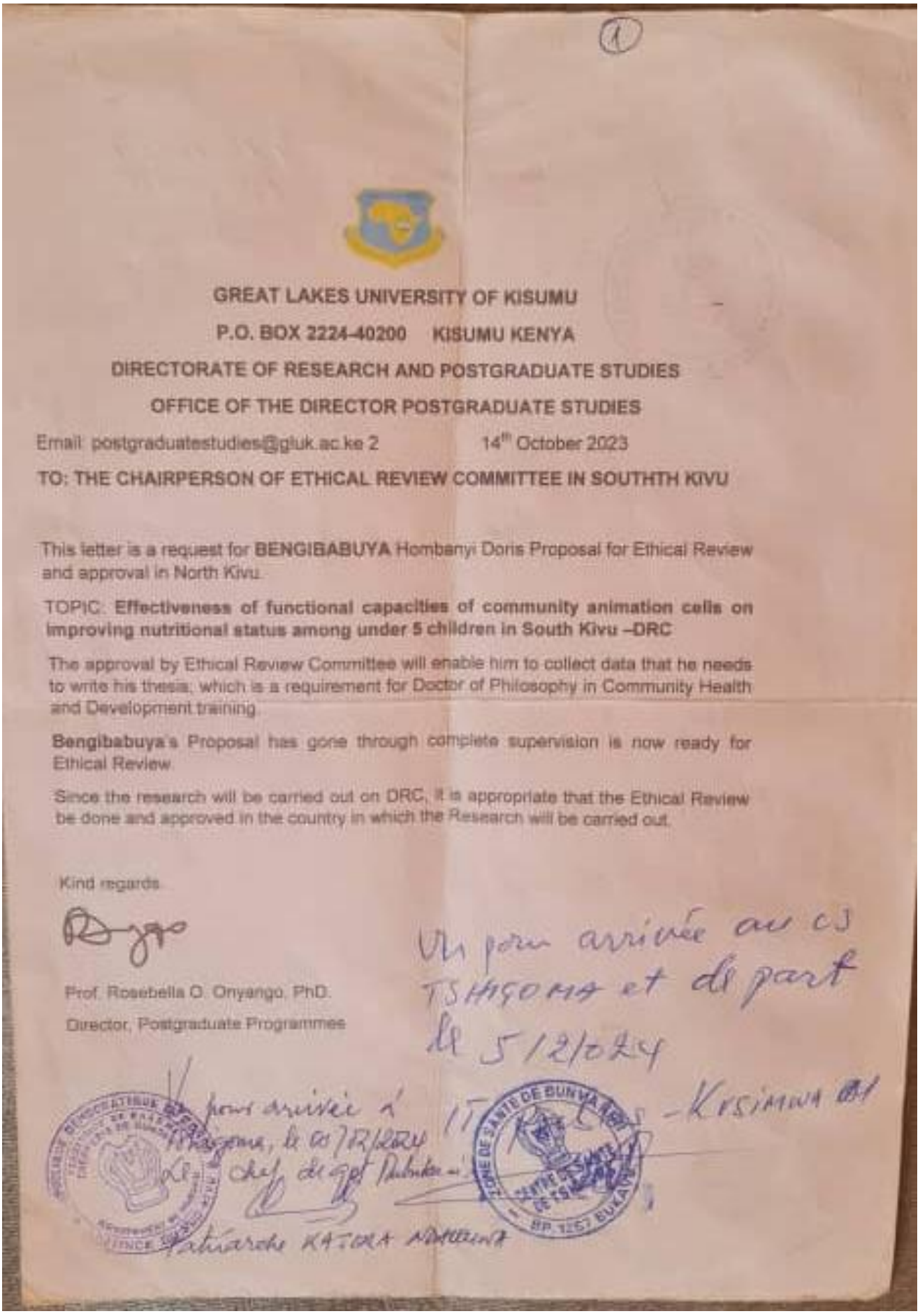
This survey is under the direction of Mr Doris Bengibabuya Hombanyi, PhD student at Great Lakes University of Kisumu "GLUK" in Kenya.
It was explained that :
The aim of this research is to determine the effectiveness of the functional capacities of the Cellules d'Animation Communautaire in improving the nutritional status of children under the age of five in South Kivu, DR Congo, such as: the knowledge, perceptions and functional practices of the Cellules d'Animation Communautaire; the factors favoring the effective implementation of the functional capacities of the Cellules d'Animation Communautaire in improving the nutritional status of children under the age of five in South Kivu, DR Congo.
To carry out this survey, interviews will be conducted with households of children aged 0-39 months, members of Community Animation Cells , health staff, members of the Bunyakiri health zone management team, the national nutrition program and technical and financial partners working in the said health zone. With my signature, I pledge to the participants to ensure the confidentiality of the data collected.
As part of my involvement in this survey, I will have access to confidential data. By signing this form, I acknowledge that I have read and understood the written consent form signed with the participants (or what will serve as oral consent) and I undertake :
- To ensure the confidentiality of data sources, i.e. not to divulge the identity of participants or any other data enabling the identification of a participant, a non-governmental organization, United Nations agencies or their stakeholders,
- To ensure the physical and computer security of the data collected,
- Not to keep copies of documents containing confidential data for any purpose other than those necessary for carrying out this research.
I declare that any attitude of lack of confidentiality and evidence of disclosure and/or sharing of information, data in connection with this project without the proven consent of the owner will be subject to prosecution followed by damages.

I, the undersigned ,..... undertake to ensure the confidentiality of the data to which I will have access.

....
Person involved in carrying out the survey Date

....
Person responsible for the survey Date

APPENDIX: XI. ETHICAL AUTHORIZATION LETTERS



(1)

GREAT LAKES UNIVERSITY OF KISUMU

P.O. BOX 2224-40200 KISUMU KENYA

DIRECTORATE OF RESEARCH AND POSTGRADUATE STUDIES

OFFICE OF THE DIRECTOR POSTGRADUATE STUDIES

Email: postgraduatestudies@gluk.ac.ke 2 14th October 2023

TO: THE CHAIRPERSON OF ETHICAL REVIEW COMMITTEE IN SOUTHTH KIVU

This letter is a request for **BENGIBABUYA** Hombanyi Doris Proposal for Ethical Review and approval in North Kivu.

TOPIC: **Effectiveness of functional capacities of community animation cells on improving nutritional status among under 5 children in South Kivu –DRC**

The approval by Ethical Review Committee will enable him to collect data that he needs to write his thesis, which is a requirement for Doctor of Philosophy in Community Health and Development training.

Bengibabuya's Proposal has gone through complete supervision is now ready for Ethical Review.

Since the research will be carried out on DRC, it is appropriate that the Ethical Review be done and approved in the country in which the Research will be carried out.

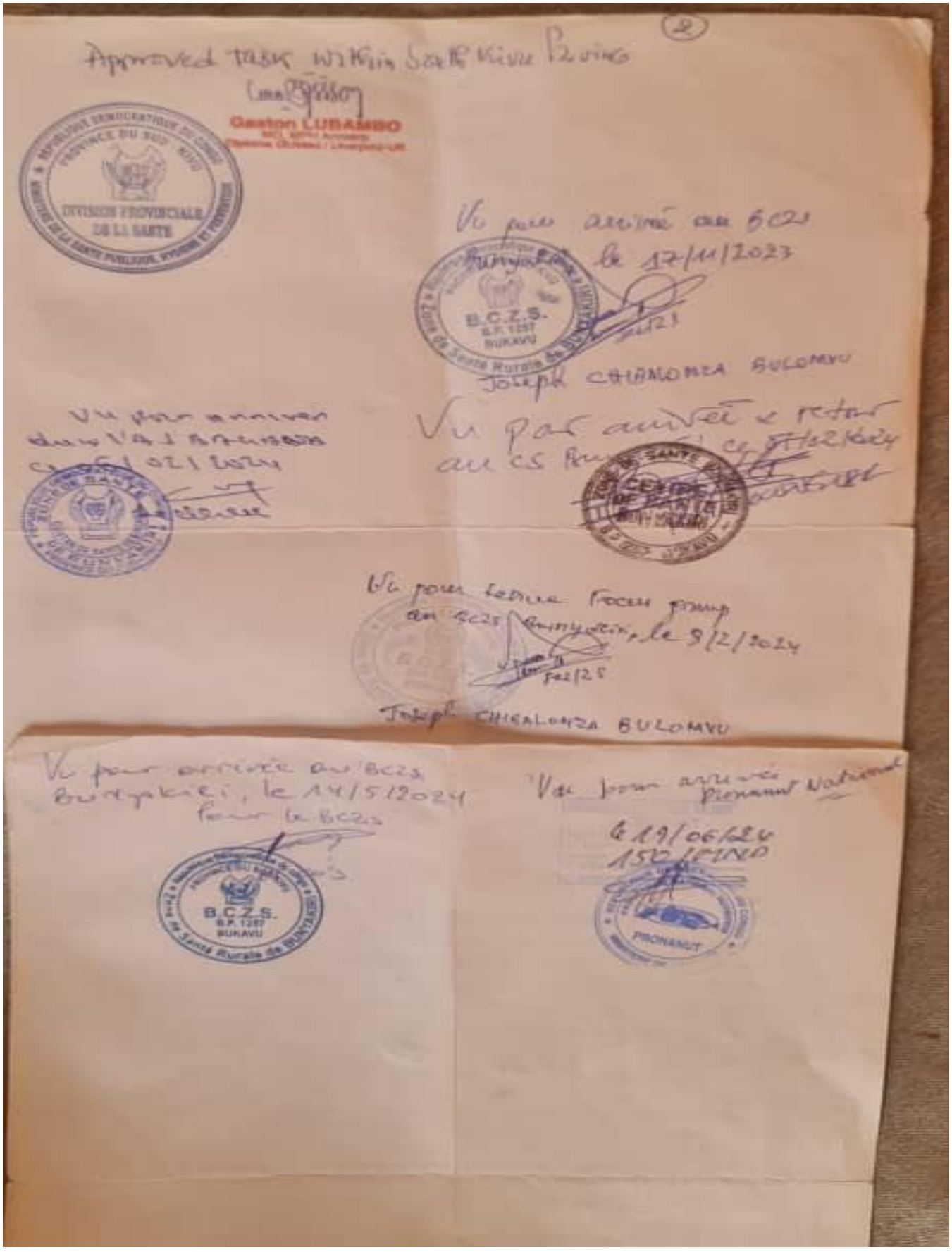
Kind regards

Prof. Rosebella O. Onyango, PhD.

Director, Postgraduate Programmes

Vu pour arrivée au CS TSHISOMO et départ le 5/12/2024

Vu pour arrivée à ... le 05/12/2024 ... Chef de Bureau ... Patriarche KATOKA ...


Approved TASK WITHIN South Kivu Province
Gaston LUBAMBO
DIVISION PROVINCIALE DE LA SANTE
Vu pour arrivé au BCZS le 17/11/2023
B.C.Z.S.
B.P. 1287
BUKAVU
Joseph CHISALONGA BULOMVU
Vu pour arrivé dans l'Aire de Santé
Vu pour arrivé et retour au CS
Vu pour lecture Focus group au BCZS Kamyotsi, le 9/12/2024
Joseph CHISALONGA BULOMVU
Vu pour arrivée au BCZS Bukyakwi, le 14/5/2024
Pour le BCZS
B.C.Z.S.
B.P. 1287
BUKAVU
Vu pour arrivée Pionnant National
19/06/24
PIONNANT