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EXPANDED IMPACT CHILD SURVIVAL PROJECT

Cameroon

Community Case-Management of Pneumonia with Oral Amoxicillin

Operations Research Final Report

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Plan

Plan International USA, Inc.
1730 Rhode Island Avenue, NW, 11th Floor
Washington, DC 20036

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Plan Field Contact

Dr. Ephraim Toh, *Country Health Advisor*

Plan International Cameroon

Opposite German Embassy

Bastos, PO Box 25236

Messa, Yaoundé, Cameroon

Tel. (+237) 221 0700

ephraim.toh@plan-international.org

Plan HQ Contact

Ryan Lander, *HIV and Health Technical Advisor*

Plan International USA, Inc.

1730 Rhode Island Avenue, NW, Suite 1100

Washington, DC 20036

Tel. (202) 223-8325

ryan.lander@planusa.org

Research Team

N°	Name	Organization
1.	M.Toumamiko Mefane B.	Chief of Service, monitoring and Evaluation, National IMCI focal Point, Department of Family Health – Ministry of Public Health.
2.	Dr. Njoumemi Zachariou	Faculty of Medicine and Biomedical Science – University of Yaounde 1
3.	Dr. Toh Ephraim	Plan Cameroon
4.	Mathilda Tingu	Plan Cameroon
5.	Ngo Ngan Louise	Plan Cameroon
6.	Dr. Ajabmoh Henry	District Medical Officer Bafut/ Ministry of Public Health
7.	Mr. Mbanwi Moses	Chief of Bureau Health Bafut/Ministry fo Public Health
8.	Siobhan Perkins	Peace Corps Volunteer
9.	Ngwa Chris Akonwi	Plan Cameroon
10.	Mr. Nkwain Joseph	M&E Focal Point, Regional delegation of Public health for the north west Region

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Acronyms and Abbreviations

ACTs	Artemisinin Combination Therapy
AIDS	Acquired Immune Deficiency Syndrome
ANC	Ante natal Care
ARI	Acute Respiratory Infections
BASICS	Basic Support for Institutionalising Child Survival
BCG	Bacillus Calmette-Guerin
BEPC	Brevet d'Etudes du Premier Cycle
BHR	Bureau for Humanitarian Relief
CBO	Community Based Organisation
CCM	Community case management
CCM	Community Case Management
CDD	Control of Diarrhoeal Diseases
C-IMCI	Community Integrated Management of Childhood Illnesses
CORE	Collaboration and Resources Group
DFH	Department of Family Health
DHS	Demographic health Survey
DIP	Detailed Implementation Plan
DMO	District Medical Officer
DMT	District Management Team
EIP	Child Survival Project
EIP	Expanded Impact Child Survival Project
EPI	Expanded Program of Immunisation
EPI Info	Epidemiological Information
FLHF	Frontline Health Facility
FLHF	Front Line Health Facility
FLHS	First Line Health Service
GUH	Growing Up Healthy Domain
Hib	<i>Haemophilus Influenza</i> type b
HIV	Human Immunodeficiency Virus
HKI	Helen Keller International
IHC	Integrated Health Centre
IHFA	Integrated Health Facility Assessment



IHFA	Integrated Health Facility Assessment
IMCI	Integrated Management of Childhood Illness
KPC	Knowledge Practice and Coverage
MCH	Maternal and Child Health
MCM	Malaria Case Management
MOH	Ministry of Health
NGOs	Non-Governmental Organizations
ORS/RHF	Oral Re-hydration Salt or Solution/Home Recommended Fluids
PVC/PVO	Private Voluntary Corporation/ Organization
RBM	Toll Back Malaria
RBM	Roll Back Malaria
SASNIM	Semaine d'Action de Sante Infantile et Maternelle (Mother and Child Health Nutrition Action Week)
SPSS	Statistical Package for Social Sciences
STDs	Sexually Transmitted Diseases
TDR	Termes de Reference (Terms of Reference)
UNICEF	United Nations Children Fund
URTI	Upper Respiratory Tract Infection
USAID	United States Agency for International Development
USNO	PLAN United States National Office
WHO	World Health Organization
WRA	Women of reproductive Age



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I. INTRODUCTION

1.1. Program Overview

From November 2009 to September 2010, Plan Cameroon, in partnership with the Ministry of Public Health (MOH), conducted an operations research study on the Community-Case Management (CCM) of pneumonia in the North West Province.

Since October 2005, Plan Cameroon, in partnership with Population Services International (PSI) and Helen Keller International (HKI), has been implementing a five-year USAID-funded Bundled Child Survival, Expanded Impact Project (EIP) to support the MOH in improving the health status of children under five (U5) and women of reproductive age (WRA). The EIP implementation strategy entailed the nationwide scale-up of the Integrated Management of Childhood Illness (IMCI) and Roll Back Malaria (RBM) initiatives.

The project built on lessons learned from piloting IMCI/RBM during the Plan Cameroon Child Survival XVI (CSXVI) project in three districts of the Eastern province (1999 – 2004), as well as the partners' collective expertise in implementing 39 centrally-funded USAID child survival (CS) grants globally. At the sub-national level, the EIP focused on community-level activities in 11 health districts within the Centre, East and North-West Provinces of Cameroon. The EIP also supported the MOH and private health facility structures that impact all 55 health-districts in these three provinces. Nationally, the project partners continue to conduct country-wide advocacy campaigns, influencing national policy and extending lessons learned throughout their program areas, reaching all 10 provinces. Internationally, Plan, PSI and HKI are disseminating EIP lessons learned to their health and development programs in the region, and through active participation in the Child Survival and Collaborations and Resources (CORE) Group.

1.2. Basic Concepts

What is community case management?

Programs using community case management (CCM) of childhood pneumonia facilitate treatment of non-severe acute respiratory infections (ARI) and rapid referral of severe cases in communities that have difficulty accessing to health facilities. CCM of pneumonia interventions have also been a critical platform for introducing or improving community approaches to malaria, diarrhea, and malnutrition. The characteristics of the CCM approach include the following:

- Focus on pneumonia treatment, but integrate it with treatment at community level for malaria, diarrhea, and malnutrition;
- Community health workers (CHWs) treat non-complicated cases and refer severe cases to health facilities;
- CHWs are unpaid community volunteers;
- No active case finding occurs, but home visits are used to follow up on cases; and
- CHWs operate from health posts that are in their home or in a facility built by the community.

Why is community case management important to child health?

CCM-pneumonia increases the number of children receiving quality care for infections, estimated to cause nearly 20% of all under-five deaths in the developing world. This intervention can also significantly improve facility-based treatment programs as early management of simple pneumonia at the community level reduces the number of cases that develop severe symptoms, and therefore, lowers the frequency of care-seeking at health posts. Furthermore, as the number of non-severely ill children presenting at facilities decreases, health posts are better able to serve children in need of the most urgent care.

What is the implementation process?

Implementation of CCM-pneumonia comprises 10 steps listed below. Resources shown in bold are components of the implementation package developed in Cameroon and can serve as a basis for adaptation in other countries.

	Implementation step	Key resources
1	Conducting advocacy	
2	Setting up a task force and a technical working group to lead the process	
3	Developing and/or updating guidelines and tools	
4	Addressing logistical (commodity) needs	
5	Identifying treatment sites and volunteers	• Site guide
6	Training	• Trainers Guide • Community relays manual • Sick child recording forms
7	Conducting post-training support and supervision, including the use of data for decision making and monitoring	• Supervision guide • Sick child recording forms • Community relays tools
8	Mobilizing and educating communities	• Communications guide
9	Reviewing or evaluating early phase implementation	
10	Scaling up	

1.3. Problem Statement

In low-income countries in Southeast Asia and Sub-Saharan Africa, close to 10.6 million children under five years die annually from avoidable and/or curable diseases, including pneumonia.^{i,ii} One-fifth of deaths (~ two million children U5) is attributed to pneumonia each year.ⁱⁱⁱ Despite the availability of effective interventions, millions of children do not have access to basic health care. In Cameroon, only 35 of the 865 U5 pneumonia cases recorded in 2008 were treated.^{iv} Current health services cannot cover all health interventions needed to ensure the highest rates of child survival, which means that between 40-80% die at home.^v A majority of these deaths could be prevented through an appropriate, cost-effective preliminary CCM of pneumonia in particular, and of other deadly diseases generally, in an integrated manner as prescribed by the IMCI protocol.^{vi} Pneumonia is one of the priority target illnesses in the IMCI protocol at the community level in developing countries.^{vii}

In Cameroon, the infant mortality rate stands at 74 per 1000 live births and varies from one region to another (e.g. 58 per 1000 live births in the North West to 111 per 1000 live births in

the East). The mortality rate is less in urban regions (68 per 1000 live births) compared to rural regions (91 per 1000 live births). According to the 2004 Demographic Health Survey, the child mortality rate is 144 per 1000 live births (DHS III 2004). Furthermore, in Cameroon as in many other Sub-Saharan African countries, between 50% and 80% of infant deaths are at the home and/or community level.^{viii}

Among the major infant mortality determinants from the 2004 DHS that are found at the home level, we can cite:

- Low health coverage by quality health care infrastructure and qualified health care personnel, which is inequitably distributed between urban and rural zones;
- Limited population access to health care services due to geographical, economic and cultural factors;
- Insufficient information, education and communication available and inaccessibility of health care services;
- Weak essential drug delivery system in remote rural areas; and
- Low participation of households and communities in the prevention and management of health problems.

Additionally, pneumonia is one of the leading causes of death among children under five in Cameroon. Its prevalence, estimated on the basis of a cough accompanied by short and rapid breathing, is estimated at 11% among children under five years of age and 15% among children 6-23 months (DHS III 2004). This rate is virtually identical in both rural and urban areas, being 11% and 12% respectively. The 2006 EIP Knowledge, Practices, and Coverage (KPC) survey showed that 75.2% of children 0 to 23 months in the two weeks preceding the survey in the North West Province experienced rapid or difficulty breathing, while 66.7% of children experienced these symptoms in the Center and 42.4% in the East Provinces. Only half, or 51.9%, of sick children presenting with a history of ARI had all ARI assessment tasks completed, according to the 2006 EIP Integrated Health Facility Assessment (IHFA). In addition, the percentage of pneumonia cases prescribed an appropriate antibiotic was 20.7%, while the percentage of children with simple Upper Respiratory Tract Infection (URTI) who received an antibiotic was 70.8%.

Isolated interventions do not allow for the effective and lasting control of pneumonia. Prevention by vaccination and reduction of environmental and nutritional risk factors is as important as the curative dimension of pneumonia management. For example, appropriate feeding (including exclusive breast-feeding until six months, as well as the supplementation of vitamin A), good sanitation and hygiene practices, and increased immunization coverage to prevent *Haemophilus influenzae* infections type B (Hib), measles and whooping cough are high-impact interventions to prevent the onset of pneumonia.

In developing countries, most children presenting pneumonia signs (i.e., cough, rapid or difficulty breathing, fever and/or difficulties eating, loud breathing, and lethargy in serious cases) require antibiotics. CCM of pneumonia programs utilizing antibiotics are being implemented in several African and Asian countries, such as Senegal, Democratic Republic of the Congo, Bangladesh, India, Nepal, Pakistan, The Philippines, Tanzania, Uganda, Sudan, and China.

In Cameroon, a majority of cases of pneumonia in children less than five years of age is of bacterial origin^{ix}. In most cases, the main bacterial agents responsible for the advent of severe pneumonia are *Streptococcus pneumoniae* and *Haemophilus influenzae* Type B^x (Greenwood on 1992; Shann and al. 1984, Simoes and al. 2006). Other germs include *Klebsiella pneumoniae* and *Staphylococcus aureus*. It is possible to treat effectively, and frequently do not require the use of expensive antibiotics, but which can be provided at the household level given that community relays are adequately trained, follow training guidelines, and administer treatment according to the World Health Organization (WHO) IMCI protocol.

Experience has shown that in developing countries, among interventions aimed at the reduction of infant mortality, CCM of pneumonia proves to be the least costly and most efficient^{xi}. According to the results of a meta-analysis of nine studies carried out in seven countries, the community case management of pneumonia resulted in the reduction of child mortality rates by 26% and pneumonia-specific mortality rates between 30-37%.^{xii,xiii,xiv,xv}

In Cameroon, community relays are already playing an important role in the effective and efficient management, at the individual level, of certain public health concerns, including the home management of onchocerciasis, malaria, tuberculosis, vaccination, vitamin A supplementation, and reproductive health issues, among other matters (Njournemi 2007; TDR 2008).

In early childhood, pneumonia and malaria can have very similar symptoms. It can be difficult to determine if high temperature, cough and rapid respiration are pneumonia or malaria symptoms, hence the necessity of effective management of these two diseases at the community level. In districts where community relays are involved in the home-management of malaria for children, failure to integrate the home-management of pneumonia will lead to inefficient management of the cases of malaria in the context of the practice of C-IMCI. In fact, the home management of malaria alone will not result in the correct identification, diagnosis, treatment and/or referral of cases of pneumonia and other illnesses, which is the underlying principle of IMCI.^{xvi}

Community IMCI is one of the non-clinical approaches that offers treatment services. It consists of giving appropriately trained non-professionals (i.e., community relays) – operating under the supervision of trained paramedical and/or medical staff – the task of offering treatment services to other members of the community. This new community approach minimizes the challenges due to insufficient health facilities and personnel, as well as geographical, financial, economic and socio-cultural barriers that limit access to treatment. While bringing users closer to health facilities, this new approach also increases the level of education and practice via the use of relays from the communities, taking into consideration the concerns of rural and semi-urban populations who are the principal beneficiaries.

Consequently, the introduction of IMCI at the household and/or community level in the existing primary health care program remains a priority health policy for the implementation of the three components of IMCI. These three components include:



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1. Improvement in the case management skills of health staff through the provision of locally adapted guidelines on integrated management of childhood illness and activities to promote their use.
 2. Improvement in the health system required for effective management of childhood illness.
 3. Improvement in family and community practices.

The MOH, in collaboration with the Faculty of Medicine and Biomedical Sciences and with the technical and financial support of Plan Cameroon, carried out an operational research study in Bafut Health District in the North West Region, where Community IMCI is already being implemented. The primary objective of this research is to assess the feasibility and the advantages of the CCM of pneumonia at community level in Cameroon.

II. RESEARCH OBJECTIVES

First principle: The early diagnoses and provision of first-line treatment for pneumonia ameliorates the prevalence of sick children less than five years of age.

Second principle: Community case management of pneumonia improves treatment of the illness.

Hypothesis: Based on the success of other community-based interventions with the same target population, community case management of pneumonia is feasible in Cameroon.

This operational research sought to answer the following questions with respect to the use of antibiotics at the household and community level:

1. What is the level of knowledge on CCM of pneumonia (strategies, difficulties, possible solutions)?
2. What are the effects of the introduction of CCM of pneumonia with oral antibiotics on:
 - 2.1. Management of child illness?
 - 2.2. Community relays?
 - 2.3. Health system?
3. What are the possible problems to be faced in the implementation of CCM of pneumonia and IMCI in Cameroon with respect to the following aspects:
 - 3.1. Training of community relays
 - 3.2. Identification and treatment of pneumonia
 - 3.3. Reference and counter reference
 - 3.4. Management of drug stocks
 - 3.5. Data management
4. What are the critical factors susceptible to positively or negatively influence CCM of pneumonia by oral antibiotics?

2.1. Objectives of the Operational Research

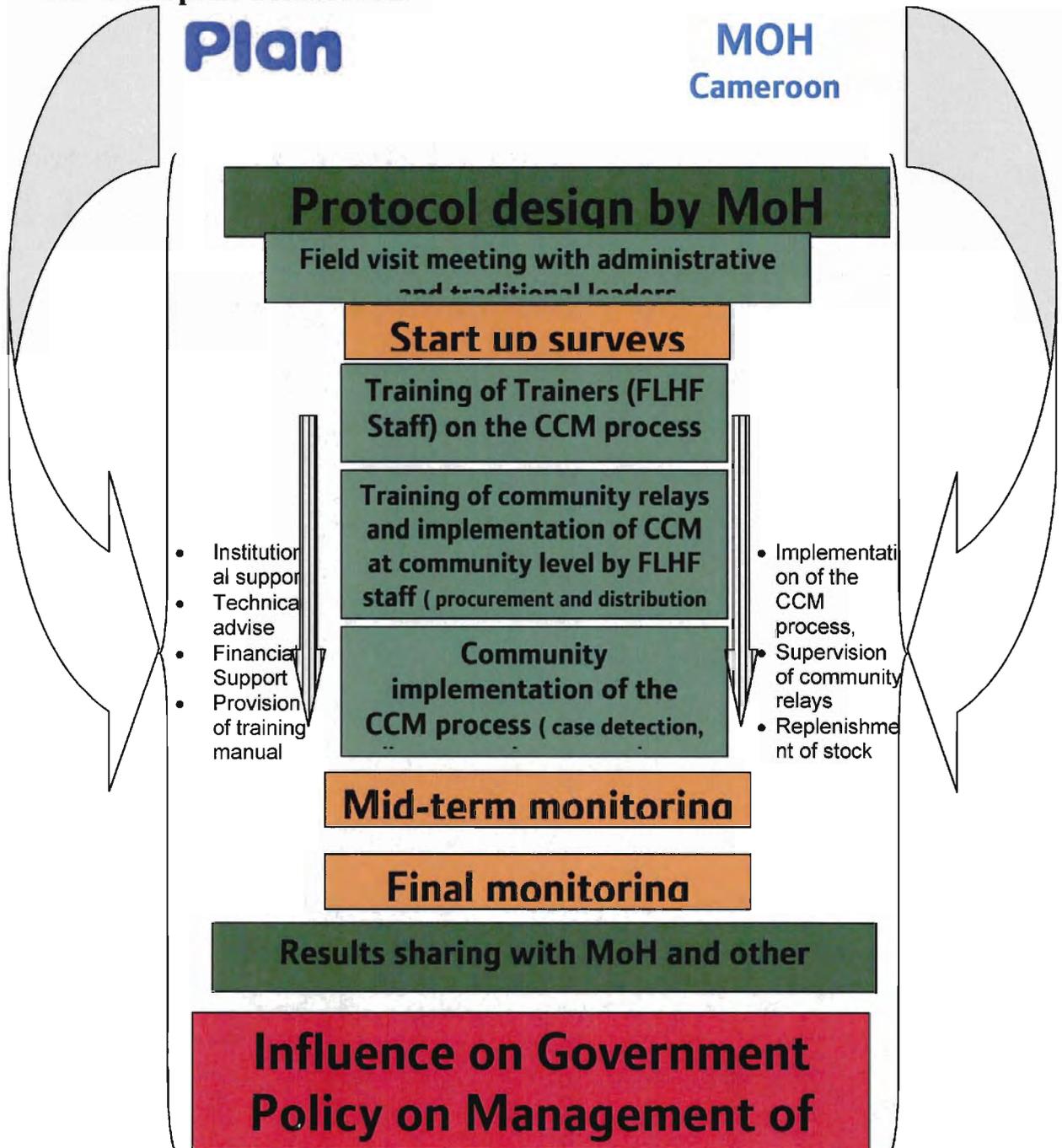
General Objective: Provide necessary information to the MOH for the CCM of childhood illnesses in general and pneumonia in particular.

Specific Objectives:

- Document the Community IMCI process generally and the CCM of pneumonia in particular, according to the new WHO protocol.
- Determine the effectiveness of the Community IMCI process according to the new WHO protocol. In the present study, effectiveness is measure by the number of people treated and compliance with the study interventions.
- Demonstrate that CCM of pneumonia in U5 children is cost-effective and contributes to alleviate excessive out-of-pocket health expenditures by families.
- Identify critical technical, economic, and socio-cultural factors that can facilitate or impede the CCM process.
- Propose recommendations for taking CCM of pneumonia to scale.

III. METHODOLOGY

3.1. Conceptual Framework



3.2. Type of Study

Several approaches were used to collect data. Two cross-sectional quantitative surveys targeting caretakers of children with diarrhea were carried out: one before the intervention (introduction of pneumonia treatment with oral amoxicillin 500mg) and the other 10 months later. Qualitative tools (in-depth interviews) were used with caretakers of children and health service providers (i.e., health personnel, CHWs/relays, and participating community-based organization members). The mothers of children who received oral amoxicillin were also followed up to examine compliance with treatment. Other information for this report was derived from monitoring/supervision of the different actors.

3.3. Quantitative Surveys

This element involved a baseline and final survey: in each case, a sample of mothers (558 in the baseline and 520 in the final) were randomly selected from the 10 health areas of the Bafut Health District, which was implementing the Community Case Management of pneumonia. In the control area (3 health areas where the CCM was not implemented), 120 randomly selected mothers were interviewed during the Mid-term and Final evaluation.. Mothers whose children had suffered from cough or fast breathing in the two weeks preceding the survey were interviewed. Information was collected on the following indicators:

- Use of oral amoxicillin to treat simple pneumonia episodes in their children;
- Source for care in the treatment of pneumonia and the reasons for seeking treatment in those places;
- Knowledge of the treatment of pneumonia with oral amoxicillin;
- Cost of treatment of pneumonia with oral amoxicillin;
- Prevalence of pneumonia;
- Caretaker management of child illness;
- Assessment of treatment completion rate;
- Community relay involvement in the case management of pneumonia;
- Supervision;
- Community relay knowledge and practice; and
- Community satisfaction

3.4. Qualitative Research

The objectives of this element were to:

- Examine the factors that compel caretakers of children with pneumonia to seek treatment outside of the home (i.e., facilitating factors) and reasons for not seeking treatment (i.e., barriers);
- Describe the sources of treatment for pneumonia (e.g., health facility, community network, traditional healers, informal sector drug sellers, etc.);
- Examine caretakers' and health service providers' perceptions of oral amoxicillin tablets for the treatment of pneumonia;
- Identify contextual factors associated with the amoxicillin tablets use, such as appropriate dosage (250mg or 500mg); and

-
- Examine the prevalence and appeal of non-recommended treatment practices for uncomplicated pneumonia (other antibiotics, injections, anti-diarrheal drugs, laxatives, etc.)

Qualitative research involved in-depth interviews with service providers (i.e., health staff and community agents), mothers, and community leaders.

3.5. Home Follow-Up

Home visits were made to mothers whose children were on pneumonia treatment and to the community relays in charge of distributing the oral amoxicillin, and data was collected concerning:

- Quantity of oral amoxicillin prescribed;
- Quantity of oral amoxicillin purchased;
- Drug management by the community relay;
- Number of days of oral amoxicillin treatment given;
- Attitude of caregivers in relation to the management of pneumonia in children;
- Distribution techniques of oral amoxicillin; and
- Difficulties associated with the administration of oral amoxicillin.

IV. DESCRIPTION OF INTERVENTION

The pilot interventions that were put in place after the baseline survey consisted of the following:

4.1. Policy

The MOH developed the research protocol at the policy-level, which was approved by the Minister of Public Health. The MOH also led the operations research activities with the technical advice from the Faculty of Medicine and Biomedical Sciences and Plan Cameroon.

4.2. Stakeholder Capacity Building

4.2.1. Training of frontline health facility staff and district health service staff

There was a two-day training-of-trainers session on the case management of pneumonia at the community level. This training brought together all 13 health area chiefs that make up the Bafut Health District. The chiefs were then capable of training the various community relays in their areas.

The major highlights of this training were constituted in the following modules:

- **How do people contract malaria and pneumonia?** This module was drawn from the *EIP C-IMCI Training Modules for Community Relays* package (malaria and pneumonia modules).
- **Caring for the sick child.** For this module, the *Caring for the Sick Child in the Community, Manual for the Community Health Worker* developed by WHO in April 2009 was used. This manual explains how integrated childhood illnesses can be identified, classified, and treated.
- **How to identify danger signs.** This module was designed to emphasize danger sign identification using the *EIP C-IMCI Training Modules for Community Relays Manual*.
- **Monitoring and evaluation tools.** These tools were divided into two parts: 1) the baseline survey questionnaires; and 2) the community relay tools. The community relay tools are a series of documents designed to track the drug management of the community relay, the number of cases received, the treatment provided, and compliance with the protocol. Secondly, the tools also track the performance of the health information system, as well as the mortality and morbidity rates due to pneumonia at the community level.
- **Sick child recording form.** This tool was also developed by WHO for community-based treatment of children aged two months to five years.
- **Logistics.** This module addressed the issue of drug management.

The health area chiefs pre-tested all the data collection tools (baseline survey questionnaires and community relay tools). At the end of the training, amendments made to the questionnaires were adopted. **In all, 13 frontline health facility staff and four district health service staff were trained on the CCM of pneumonia with oral amoxicillin.**

4.2.2. Selection of community relays

After the baseline data collection, the EIP team then focused on the implementation of CCM. The next step began with the selection and training of community relays that would be in charge of implementing the CCM process within the communities.

In the Bafut Health District, home management of malaria with artemisinin combination therapy (ACTs) was already ongoing. In order to enhance the existing health system, community relays involved in the home-management of malaria were chosen for the CCM of pneumonia, for the following reasons:

- The communities already recognized the malaria relays, thus recruitment of new relays could create conflict; and
- The selected relays already had a significant amount of experience with IMCI and thus would be better equipped to implement the CCM process.

In communities where the CHWs for malaria had dropped out, new CHWs were selected by the Health Area Committee, which is made up of the Integrated Health Center Chief, community leaders, and officials elected by the community, through an acceptable democratic process with the following criteria:

- Available to work as a volunteer for the community
- Resident in the community for at least two years
- Willing and able to stay in the community for at least two years
- Know how to read and write
- Accepted by the community

The number of community relays selected per health area was as follows:

Health area	Number of community relays selected
Akofunguba	10
Akossia	6
Buwe Bukari	9
Mambu	10
Manji	10
Mankanikong	9
Mankwi	4
Mbakong	9
Mforya	7
Mundum	10
Nsem	9
Nsoh	7
Tingoh	7
Total	107

4.2.3. Training of community relays

In the implementation of the study, per the MOH protocol, Bafut Health District was divided into two zones: an implementation zone and a control zone. The sociocultural determinants of

the populations in the implementation and control zones were similar. However, the control zone districts differed only in that the community relays (17) received the trainings, but were not allowed to provide consultations or prescribe oral amoxicillin for pneumonia.

The grouping of the health areas into implementation and control zones were as follows:

Health areas of the implementation zone	Health areas of the control zone
1. Mbakong	1. Tingoh
2. Buwe Bukari	2. Mankwi
3. Nsem	3. Akossia
4. Mambuh	
5. Manji	
6. Mankanikong	
7. Akofungubah	
8. Mundum	
9. Mforya	
10. Nsoh	

The 10 health areas of the implementation zone were divided into four subgroups to facilitate training in order to ensure that no more than 30 community relays would be trained in one session. Consequently, the groups were formed taking proximity and accessibility into consideration. Based on these criteria, the following subgroups were formed:

Zone	Health areas	Place of training	Number of relays	Facilitators/health area chiefs from:
1	Buwe Bukari Mbakong	Tingoh	18	Tingoh Buwe Bukari Mbakong
2	Manji Nsem Mforya	Manji	26	Manji Nsem Mforya Akossia
3	Akofungubah Mundum	Akofungubah	20	Akofungubah Mundum
4	Mankanikong Mambuh Nsoh	Mankanikong	26	Mankanikong Mambuh Nsoh

The relays were trained on the same modules as those used during the training-of-trainers of health area chiefs, with emphasis given to the identification of danger signs, sick child recording forms, community relay tools, and drug management. Community relays then evaluated, classified, and treated or referred all health problems in children between two and 59 months of age according to the WHO IMCI protocol. This community approach helped introduce household treatment, such that a child sick with pneumonia or any other illness can be identified and treated before complications manifest themselves. The fundamental steps in the community IMCI are:

- Child evaluation
- Classification
- Treatment and/or referral

4.3. Provision of Oral Amoxicillin and Supplies

The Health Area Chiefs were each provided with *Caring for the Sick Child in the Community, Manual for the Community Health Worker* manuals; community relay tools (see below for description), and data collection questionnaires.

The community relays were each provided with 120 tablets of oral amoxicillin 500mg. Taking into consideration the fact that the frontline health facilities had stocks of oral amoxicillin, the relays were not given additional stocks. Thus a total of 10,800 oral amoxicillin tablets were distributed to the 90 community relays.

Secondly, the relays were each given the following working documents:

- Sick child recording forms (120 copies of the WHO sick child recording forms grouped in book form)
- Community relay tools: a booklet with a set of tools used for tracking the activity of the community relay, which included the following:
 - Drug consumption checklist
 - Reference and counter reference forms
 - Monthly summary
 - Community relay supervision checklist.
- Security box (a metallic box where the documents and the drugs were secured)
- *Caring for the Sick Child in the Community, Manual for the Community Health Worker* manual, which is the booklet developed to explain how to care for the sick child at the community level

In collaboration with the Health Area Chiefs, the district health service, and traditional and administrative authorities, a consensus was reached that, for the sake of sustainability, the community relays would sell the amoxicillin tablets provided at 35frs CFA (~\$0.07 USD), the same cost of the tablets at the health facilities. The difference between the supply cost, which was 25frs per tablet, and the selling cost was used as incentives for the community relays. The replenishment of the community relays' stocks was the responsibility of the Health Area Chiefs, who also supervised the relays on a monthly basis using the supervision checklist.

Thus the following supplies were made available to each community relay:

Supplies/Materials	Quantity
Tablets of oral amoxicillin 500mg	10800
Security boxes	90
Sick child recording form (booklets of 120 forms each)	120 forms in 1 booklet
<i>Caring for the Sick Child</i> booklets	120
Community relay tools	120

4.4. Treatment Protocol

The following treatment for simple pneumonia was recommended during the training:

Age of child	Daily treatment	Total number of amoxicillin 500mg tablets for five days
2 – 11 months	250mg (1/2 tablet) morning, afternoon, evening	7.5 tablets
1 – 5 years	375mg (3/4 tablet) morning, afternoon, evening	11.25 tablets

The treatment was introduced in the community via two major mechanisms:

- 1) Frontline Health Facilities (Integrated Health Facilities) – 13 IHCs
- 2) Community relays – 90 community relays

4.5. Monitoring and Evaluation

The evaluation compared behaviors at baseline and at the end of the intervention. Monitoring/supervision missions of health agents were carried out every month, and a household follow-up survey was conducted to track household behaviors. The study was divided into three parts to cover the one-year period.

- Baseline at the start: November 2009
- Mid-term monitoring to identify lapses and make changes as necessary: May 2010
- Final monitoring: September 2010

During each of these monitoring sessions, data was collected from the following sources:

- Households – Mothers of children 2-59 months
- Frontline health facilities – Health area chiefs and other associated staff such as the pharmacy attendants
- Community relays
- Community leaders

4.5.1. Training of surveyors

Prior to the data collection, surveyors were trained in pools of 26 people each. Selection of candidates for training was done by the District Management Team in collaboration with the EIP regional staff, who provided the selection criteria. The District Management Team consists of all the Health Area Chiefs from that district, the District Medical Officer, the Chief of the Health Bureau, the Director of the District Hospital, the Finance Controller of the District Hospital and pharmacy attendants. Trainees were drawn from the 13 health areas that make up the Bafut Health District (two surveyors per Health Area).

The specific objectives of the training were to:

- Gather data that would enable evaluation of the MOH design strategies, as well as monitor and evaluate progress of the CCM of pneumonia;

-
- Assess the knowledge and practices of health area chiefs in order to identify constraints that contribute to poor health service provision;
 - Assess practices, including the availability of essential drugs, equipment, and materials as well as clinical organization and interaction with caretakers and children; and
 - Train local health workers in survey techniques, collection of survey data, and use of data to improve the quality of integrated case management.

Training lasted one day and provided participants with the skills needed to effectively conduct a survey. The training focused on administrative formalities for the training and the survey (e.g., logistics, lodging, feeding, and financial incentives); objectives of the training and survey; survey ethics; and organization, including team composition and definition of each team member's role. Survey tools were also studied, with emphasis on questionnaire completion techniques. The questionnaire was discussed in detail, in particular the need to understand the information each question is designed to capture, how to pose the questions, and how to reformulate without distorting the meaning of the questions. Field exercises were carried out under the supervision of the trainers at a chosen health facility, and feedback on the field trials was provided in the afternoon.

Trainees who did not complete the training or withdrew for any reason were not retained for the survey. Based on experiences gathered during the previous day by the trainers, 13 teams of two members each were formed. The MOH team also spent time supervising the interviewers.

4.5.2. Data collection and quality control

The survey effectively started on the day following the training. Each team consisted of two surveyors, and each team visited 40 households per community. The data was collected from the 13 health areas over three days. The survey consisted of 3 modules: one for the community leaders, one for the Health Area Chiefs and one for mothers of children 2-59 months. All the community leaders in a health area were interviewed by the same surveyor. All the Health Area Chiefs in the health area were interviewed by another surveyor. Both surveyors interviewed the mothers of children 2-59 months.

To ensure quality data collection, the teams met as soon as the first set of instruments was completed to review and correct any processes requiring adjustments. The supervising team continued to review subsequent instruments as they were completed and gave feedback when necessary. At the end of each day, the teams reviewed the day's work and planned for the next day.

4.5.3. Data Analysis

All questionnaires from the field were verified in detail for completeness and internal coherence. This verification was a follow-up to one conducted during data collection by survey supervisors.

Data entry and analysis were done utilizing EPI Info and the Statistical Package for Social Sciences (SPSS) statistical analysis programs. The electronic questionnaire (QES) for data entry into this software was developed by a trained EIP staff member. A check file was also

created to avoid entry redundancy and skip sections as answers prescribed. After data entry, entries appearing to be deviant were verified with questionnaires from the field. Validation was only done if the entry corresponded to what was found on the questionnaire from the field. Such deviant entries included, for example, missing data. Results of the analysis were printed out along with the instructions given to the computer to produce the results. The instructions were matched with the codes on the results sheet in order to decode the results. This exercise also permitted the verification of the computer outputs.



V. RESULTS

The following results are presented in two parts, with part one containing the key indicators and the second detailing the cost effectiveness measures. In presenting the results, we will proceed with an overview of the sample, followed by a discussion of each indicator.

5.1. Sample

5.1.1. Profile of the children seen

Data was collected on 517 children less than five years old (i.e., 2-59 months). The youngest child was two months old, the oldest 59 months. The mean age was 23.5 months (± 3.8 SDs). Sub-dividing these children into those under one year (0-11 months) and those one year or more (12 months or more) gives a distribution of 26.7% and 73.3%, respectively.

Age group of children	Frequency	Percent
2 – 11 months	138/517	26.70% (23.0 – 30.8%)
12 – 59 months	379/517	73.30% (69.20 – 77.00%)

5.1.2. Source of health care sought by caretakers

The table below presents the frequency distribution of the source of health care sought by caretakers in the community for all mothers whose children have had signs and symptoms of pneumonia at least once.

N°	Source	Baseline	Mid-term	Final
01	Community Relay	2.43%	23.70%	45.26%
02	Health Facility	49.46%	30.20%	35.00%
03	Self-medication	9.73%	8.80%	5.4%
04	Shopkeepers	5.68%	5.60%	2.1%
05	Traditional Healer	32.70%	1.20%	1.05%

The two main sources of health care sought by community members shifted between the end-line and the baseline, For example, while the number of mothers of children who visited traditional healers markedly dropping from 32.7% to 1.05% ($P=0.00015$), the number of mothers visiting community relays dramatically increased from baseline to end-line. This can likely be explained by the fact that the communities have increased awareness of the presence and utility of community relays in their communities.

Among mothers who had at least one of their children sick with pneumonia or rapid breathing in the two weeks preceding the survey, 91.04% (85/93) sought care from the community relay first; 25.81% (24/93) from the health facility; and none went to traditional doctors or shopkeepers, nor did any of them use self-medication.

5.2. Prevalence of Pneumonia

Table 1: Prevalence of pneumonia (children who presented pneumonia symptoms in the two weeks preceding the survey)

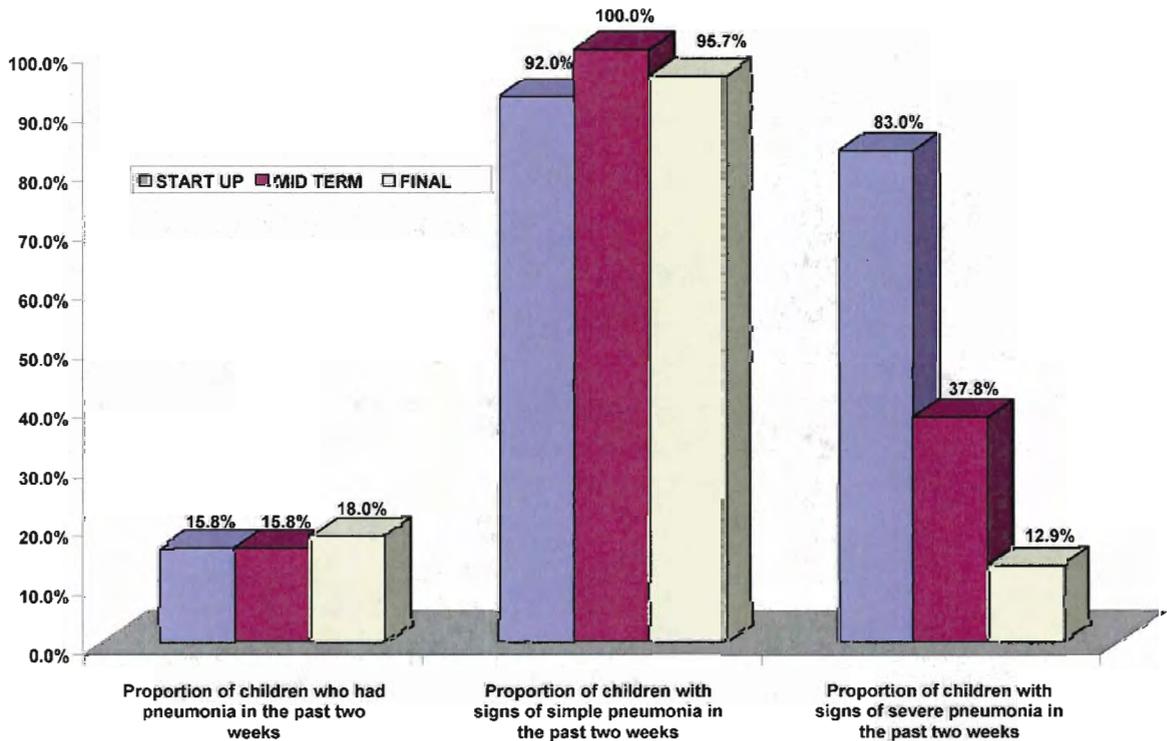
INDICATOR	BASELINE ¹		MID TERM				FINAL			
	Baseline		Case Group		Control Group		Case Group		Control Group	
Prevalence of pneumonia										
Proportion of children who had pneumonia in the past two weeks	88	15.8%	82	15.8%	7	5.8%	93	18.0%	98	81.7%
	558		520		120		517		120	
Proportion of children with signs of simple pneumonia in the past two weeks	81	92.0%	82	100.0%	6	85.7%	89	95.7%	98	100.0%
	88		82		7		93		98	
Proportion of children with signs of severe pneumonia in the past two weeks	73	83.0%	31	37.8%	3	42.9%	12	12.9%	93	94.9%
	88		82		7		93		98	
Supporting information										
Proportion of children with cough	76	95.0%	80	97.6%	7	100.0%	88	94.6%	95	98.0%
	80		82		7		93		98	
Proportion of children with faster breathing than usual	68	85.0%	38	46.3%	6	85.7%	38	40.9%	39	90.8%
	80		82		7		93		98	
Proportion of children with fever	69	86.3%	65	79.3%	7	100.0%	80	86.0%	91	92.9%
	80		82		7		93		98	
Proportion of children with convulsions	13	16.5%	5	6.1%	1	14.3%	5	5.4%	8	8.2%
	79 ²		82		7		93		98	
Proportion of children with chest in-drawing	55	71.4%	18	22.0%	3	42.9%	12	12.9%	19	19.4%
	77		82		7		93		98	
Proportion of children with breathing that produces a noise	59	74.7%	25	30.5%	3	42.9%	15	16.1%	53	54.1%
	79		82		7		93		98	
Proportion of children sleeping a lot and difficulty waking up	45	57.0%	13	15.9%	3	42.9%	10	10.8%	18	18.4%
	79		82		7		93		98	
Proportion of children unable to eat or drink	46	59.7%	25	30.5%	1	14.3%	21	22.6%	14	14.3%
	77		82		7		93		98	

¹ The baseline survey was conducted prior to the division of the survey area into an intervention and a control group.

² There is a slight variance in denominator for the baseline survey due to responses from a select number of individuals being properly recorded.

Though there is an increase in the number of simple pneumonia cases, the number of children who presented severe pneumonia symptoms greatly reduced. This change can be attributed to the early treatment of pneumonia by community relays.

Figure 1: Prevalence of pneumonia



Although all symptoms witnessed a drop from the baseline value, a significant decrease was observed in the prevalence of severe pneumonia symptoms (i.e., fever, convulsion, faster breathing than usual, chest indrawing, breathing that produces a noise, lethargy, and inability to eat or drink) compared to the simple pneumonia signs. This decrease may be attributed primarily to the treatment of pneumonia made available to the mothers at a cheaper rate and in closer proximity, with over 80% of children completing the pneumonia treatment. In a discussion with a mother in the Nchum community of the Buwe Bukari health area, she said, “My son, Suh, was really suffering; his breath was very short and difficult. But since I bought the drug from Mr. Peter [a community relay], the heavy chest he had has cleared.”

5.3. Management of the Sick Child by the Caretaker

Table 2: Management of sick child

INDICATOR	BASELINE		MID TERM				FINAL			
	Baseline		Case Group		Control group		Case Group		Control Group	
<i>Management of sick child</i>										
Proportion of children whose caretakers knew how to care for child with pneumonia	18	20.5%	63	76.8%	4	57.1%	89	95.7%	11	11.2%
	88		82		7		93		98	
Proportion of caretakers who sought help care from community relay	13	18.8%	22	26.8%	0	0.0%	80	86.0%	22	22.4%
	69		82		7		93		98	

The number of mothers who knew how to take care of a child sick with pneumonia increased from 20.5% to 95.7% (P=0.0001). This change can be likely attributed to the availability of pneumonia treatment via the CCM of pneumonia with oral amoxicillin approach coupled with the IEC activities the community relays undertook as part of their responsibilities. For example, as part of their duties, the community relays used forums such as Vaccination and Control of Diarrheal Disease (CDD) campaigns to educate the communities on the availability of pneumonia treatment. These results are further supported by the fact that 98.1% of the mothers in the community knew the community relay, 96.1% knew the responsibilities of the community relay, and 86% of the mothers were satisfied with the treatment administered by the community relay as can be seen in Figure 2 below.

After classification of pneumonia and prescription of oral amoxicillin, 98.6% of mothers purchased the drug. Of all the mothers surveyed, 93.2% of them considered the price for amoxicillin cheap or affordable.

It is also remarkable to note that 11 mothers in the control zone knew how to care for a sick child with pneumonia and 22 of these mothers in the control zone had sought help from the community relay. This situation is explained by the fact that these women meet in various places such as death celebrations, markets, and other community gatherings. These avenues are the focal points for health talks by the community relays; thus those women must have learned of the existence of community relays in their areas and sought their help in caring for their children.

Table 3: Community Involvement

INDICATOR	MID TERM				FINAL			
	Case Group		Control group		Case Group		Control Group	
<i>Community involvement</i>								
Proportion of women with children 0-59 months who know their community relay	340	85.0%	5	4.2%	507	98.1%	16	13.3%
	400		120		517		120	
Proportion of women who know the duties of community relays	326	62.7%	67	55.8%	497	96.1%	3	2.5%
	520		120		517		120	
Proportion of women who know why community relay does his job	293	56.3%	62	51.7%	451	87.2%	6	5.0%
	520		120		517		120	
Proportion of mothers with children 0-59 months who have benefited from the community relay	308	59.2%	55	45.8%	438	84.7%	28	23.3%
	520		120		517		120	
Proportion of mothers who were satisfied with the community relay's treatment	226	84.0%	43	69.4%	362	86.0%	22	78.6%
	269		62		421		28	

5.4. Assessment of Treatment Completion Rate

Table 4: Assessment of treatment completion rate

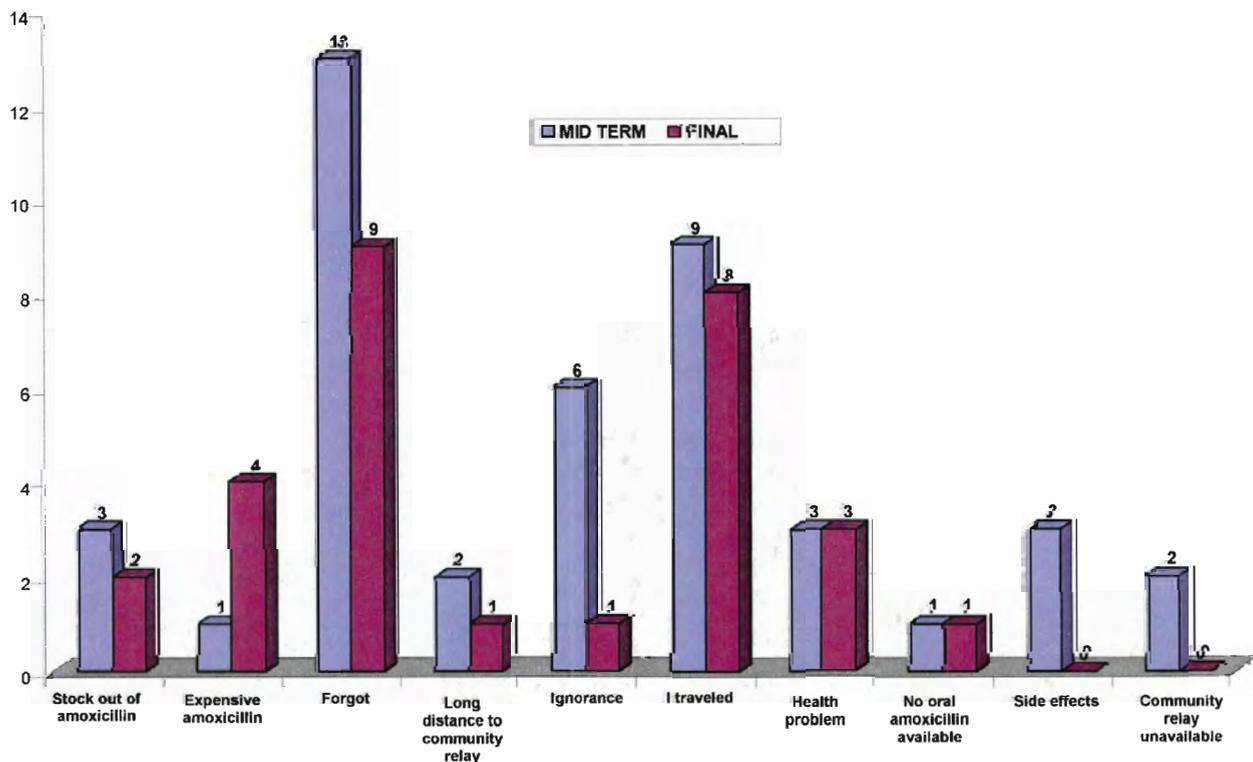
INDICATOR	MID TERM		FINAL	
	Proportion of children who have taken at least 1 dose of oral amoxicillin after classification by community relay	199	38.3%	301
	520	517		
Proportion of children who had pneumonia in the last two weeks who have started treatment	78	95.1%	93	100.0%
	82		93	
Proportion of mothers whose children have completed the pneumonia treatment	176	88.4%	296	98.3%
	199		301	
Proportion of mothers whose children had pneumonia in the past two weeks and have completed the pneumonia treatment	64	78.0%	85	91.4%
	82		93	
Proportion of mothers whose children have missed taking their treatment	23	11.6%	0	0.0%
	199		301	
Proportion of mothers whose children had pneumonia in the past two weeks and have missed taking their treatment	14	17.1%	0	0.0%
	82		93	
Proportion of mothers who were told never to miss treatment	143	69.8%	408	78.9%
	205		517	
Proportion of mothers of children who had pneumonia in the past two weeks who were told never to miss treatment	53	64.6%	93	100.0%
	82		93	

After one year of project implementation, results show that over 98.3% of the mothers completed the treatment of pneumonia with 0.0% missing treatment. It should be noted that the

five mothers who did not complete the treatment had not missed taking treatment. Their children were actually on the oral amoxicillin, and if completion was defined as per the date of the survey, these children would have been considered to have completed treatment, or more accurately as “up to date” on their treatment. This should be the underlying reason why the prevalence of the complicated signs of pneumonia has greatly dropped from baseline.

As shown in Figure 3 below, the major reasons why mothers missed treatment included ignorance and forgetfulness. However, 78% of all mothers in the target population were advised never to miss treatment and all of the mothers whose children were sick in the past two weeks were advised never to miss treatment. The corresponding results indicate that there could be a memory recall issue on the side of the mother.

Figure 3: Reasons why children missed taking pneumonia treatment



5.5. Community Relay Involvement in the Case Management of Pneumonia

Two indicators were used to evaluate the effective involvement of community relays in the case treatment process: 1) the proportion of community relays who know their responsibilities (or activities); and 2) the proportion of community relays who know their mission in the communities.

Table 5: Community relay involvement

INDICATOR	MID TERM		FINAL	
	Proportion of community relays who know at least two of three of their responsibilities ³	73	88.0%	84
	83	90		
Proportion of community relays who know their mission in the communities (i.e., proportion of community relays who know at least two reasons why they carry out their activities)	52	62.7%	89	98.9%
	83		90	

The above results show that 93% of the community relays know their responsibilities. This knowledge can be attributed to the fact that prior to the implementation of the process, all the community relays received two days of training on C-IMCI. In addition, the consistent joint supervision carried out by the MOH staff has also contributed to retention of this information. Secondly, a cross-section of the community relays were also malarial relays, and thus were likely used to filing their monthly reports and doing other routine activities like checking stock.

The six community relays who did not know at least two of their responsibilities were all newly recruited and trained replacements for relays that had left the program. Of these relays, one had died, four had traveled out of the community and one was involved in an accident. The one relay who did not know at least two reasons why the community relay carries out activities had been a community relay for only one month.

Detailed data show that 97.8% (an increase from 63.9%) of the community relays correctly filled their monthly summary reports, and close to 92% correctly filled out their drug consumption checklist. In addition, of the 90 community relays, 89 correctly consulted the children. It is also worth noting that 10% of the community relays witnessed stock-outs of amoxicillin in the past month. These stock-outs occurred in the communities farthest removed from the frontline health facilities, requiring two days on foot to travel to the health facility to resupply.

Table 6: Community relay bookkeeping

INDICATOR	MID TERM		FINAL	
	Proportion of community relays who correctly fill their monthly summary reports	53	63.9%	88
	83	90		
Proportion of community relays who correctly fill their drug consumption checklists	63	75.9%	83	92.2%
	83		90	
Proportion of community relays who correctly consult children	49	71.0%	89	98.9%
	69		90	

³ Three responsibilities include a) diagnose and treat/refer pneumonia cases; b) conduct home visits/complete activity reports; and c) conduct group health education/sensitization sessions.

Proportion of community relays who carried out home visits in the past week	67	80.7%	84	93.3%
	83		90	
Proportion of community relays who have had stock depletions in the last month	13	15.7%	9	10.0%
	83		90	

5.6. Supervision

Table 7: Community relay supervision

INDICATOR	MID TERM		FINAL	
Proportion of community relays who know their supervisor	77	92.8%	90	100.0%
	83		90	
Proportion of community relays who have received at least one supervision in the last six months	67	80.7%	90	100.0%
	83		90	
Proportion of community relays who were supervised last month	58	69.9%	83	92.2%
	83		90	

All 90 community relays stated they knew their supervisors, with all of them having received at least one supervisory visit in the last six months and 92.2% of them receiving a visit in the last month. Seven of the community relays were not supervised the previous month due to a CDD campaign that took place during the same period and required much of the IHC chiefs' time. Among the issues most discussed during the supervisory visits conducted by the IHC chief included checking the relay's monthly summary, the drug consumption checklist, and the sick child recording form, as seen in Figure 5 below.

This close collaboration with the health facilities and IHC chiefs is one of the primary factors for the project's success and its high acceptance rate in the communities and at the level of the health system. For instance, the community relays work very closely with the IHC chiefs in the areas of supervision and renewal of stock. Secondly, the mothers of the community participated in and approved the selection of the community relay. These are contributing factors towards the attainment of the program objectives.

Table 8: Activities carried out during the supervision visits

INDICATOR	MID TERM	FINAL
Checked monthly reports	65.1%	73.3%
Checked drug consumption checklist	71.1%	76.7%
Checked register (sick child recording form)	69.9%	77.8%

Conducted a visit to a family	9.6%	21.1%
Provided advice/guidance	51.8%	46.7%

Figure 4: Supervisors of community relays

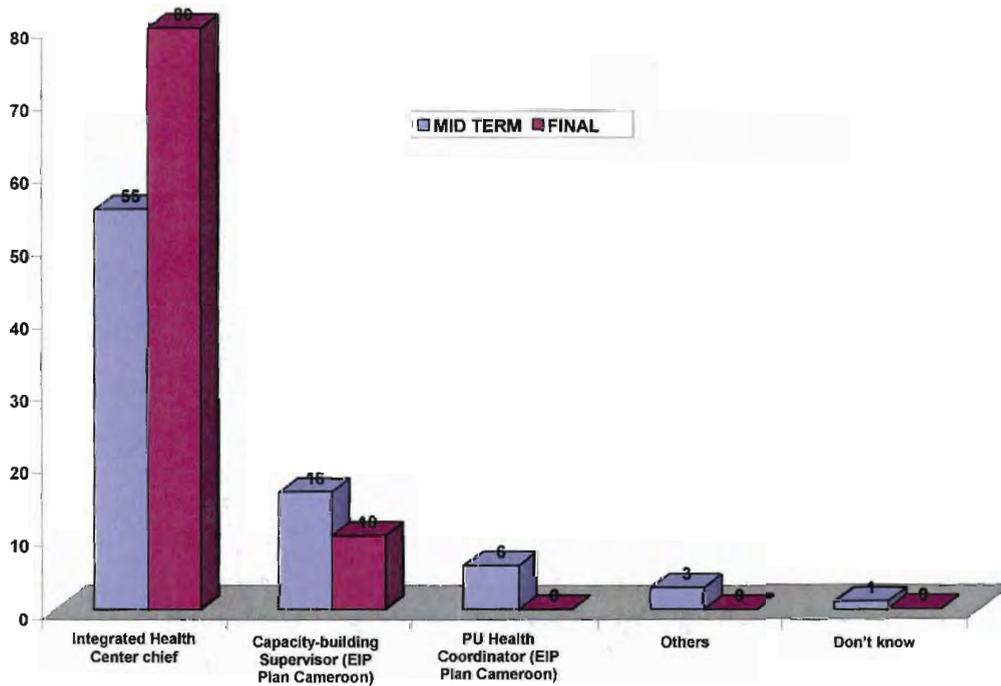
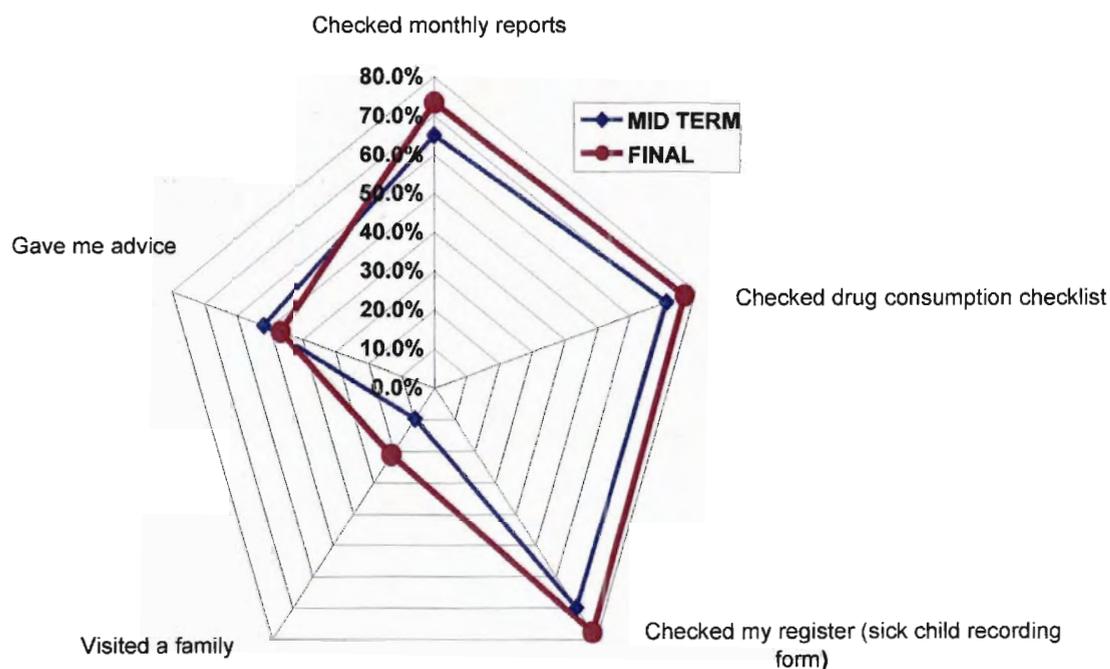


Figure 5: Information checked during supervision visits



5.7. Community Relay Knowledge and Practice

According to the data below, the knowledge of the community relay concerning the simple pneumonia signs is quite high (100%), and a good portion of the community relays know how to prescribe the amoxicillin tablets.

Table 9: Community relay knowledge and practice

INDICATOR	MID TERM		FINAL	
	Count	Percentage	Count	Percentage
Proportion of community relays who knew at least two signs of simple pneumonia and two signs of severe pneumonia	42	50.6%	86	95.6%
	83		90	
Proportion of community relays who knew how to correctly prescribe pneumonia drugs	45	54.2%	88	97.8%
	83		90	
Proportion of community relays who knew at least two signs of simple pneumonia	70	84.3%	90	100.0%
	83		90	
Proportion of community relays who knew at least two signs of severe pneumonia	45	54.2%	86	95.6%
	83		90	

Proportion of community relays who knew how to correctly prescribe amoxicillin for children 2 – 11 months	50	60.2%	89	98.9%
	83		90	
Proportion of community relays who knew how to correctly prescribe amoxicillin for children 12 – 59 months	47	56.6%	90	100.0%
	83		90	
Proportion of community relays who knew when to refer child to the hospital	65	78.3%	90	100.0%
	83		90	
Proportion of community relays who knew how to manage simple diarrhea	44	53.0%	86	95.6%
	83		90	
Proportion of community relays who knew how to prevent malaria	40	48.2%	71	78.9%
	83		90	
Proportion of community relays who knew how to prevent sickness from getting worse	38	45.8%	67	74.4%
	83		90	

The high degree of community satisfaction observed could be attributed to the fact that the community was involved in the selection and approval of the community relays. Secondly, some of the relays were also malaria relays who had already been implementing the home-management of malaria. This previous experience contributed to the confidence of the communities in the community relay's abilities.

Table 10: Community satisfaction
INDICATOR

INDICATOR		Mid Term		Final	
Proportion of mothers of children who knew the community relay's duty	Number of women who knew at least two duties of the community relay and at least two reasons why the community relay does this duty	28	65.1%	458	88.50%
	Total number of cases interviewed	43		517	
Proportion of mothers who have benefited from the services of the community relay in the last month	Number of mothers who have benefited from the community relay	39	90.7%	502	97.10%
	Total number of cases interviewed	43		517	
Proportion of mothers of children who were satisfied with the community relay's treatment	Number of mothers who said they were satisfied	38	88.4%	456	88.20%
	Total number of mothers interviewed	43		517	

VI. DISCUSSION OF RESULTS

One of the major objective of this study it to provide the necessary information to the MOH for community case management of childhood illnesses in general and pneumonia in particular. As a contribution towards achieving the above objective, this section will address the research questions and the hypothesis presented at the beginning of the report.

Overall, the implementation of the program in the Bafut Health District has been observed to be successful thus far. Significant decreases in severity and mortality have been achieved, with a decrease from 83% to 37.8% the number of children who presented severe pneumonia signs.

Although most sick children were taken to qualified providers at some stage, oral discussion with the mothers revealed that most caretakers waited more than 24 hours after illness recognition before seeking any care outside the home. Waiting for self-prescribed drugs to have effect likely explained some of the delay in seeking care from outside providers, because having used antibiotics in the home was the only risk factor for late care seeking.

1. What is the level of knowledge in the community on CCM of pneumonia?

CCM of pneumonia requires training CHWs/relays to use algorithms developed to assess danger signs in children, including presence of a cough, counting respiration rates, and looking for chest in-drawing to classify respiratory illness. CHWs recommend and dispense oral antibiotics for cases classified as simple pneumonia, usually in children 2–59 months of age, and refer young infants or children with danger signs or chest in-drawing to health facilities. The evaluation of the knowledge of the community (households and community relays) is important. Results show that 100% at final (84.3% at mid-term) of the community relays knew at least two signs of simple pneumonia, with 95.6% at final (54.2% at mid-term) knowing at least two signs of severe pneumonia. In the communities, 100% of the mothers could identify the community relay, with 65.1% knowing their responsibilities, and 90% benefiting from their services.

Models of community capacity and its central role in the provision of health care are enshrined in many key documents. They were present in the Alma Ata Declaration for Primary Health Care^{xvii} and the Ottawa Charter for Health Promotion.^{xviii} More recently, leveraging community capacity was engrained in the community- and household-IMCI models.^{xix}

Recently, Henry Mosley adapted the ideas of Peter Senge^{xx} to the global health context.^{xxi} The Mosely-Senge model articulates the idea that community members do not just “receive” or “demand” health services as beneficiaries, but rather are active agents of change, or producers of health. In terms of community health, women and mothers should be seen as frontline workers and an integral part of the health system. Just as there is a need for competent health service providers to deliver services such as immunization and case-management of pneumonia, there is also a need for competent individuals, acting either alone or collectively through community organizations that can generate effective demand for those services.

However, the role of the community is even more expansive than to just demand formally delivered services. The Mosley-Senge model entails the production of health within a local system, and include managers/providers, policymakers, interest groups, and households, which have the following principal roles:

- 1) They are the primary units for the production of health. Mothers are the primary managers and implementers of the household health production tasks and are the primary beneficiaries.
- 2) Households, like every social institution, have three basic competencies for the production of the desired outputs: values and beliefs, practices, and tangible resources.
- 3) Households produce health in the context of the local community and the wider society, which are a nation's health production system and the (hopefully) enabling environment.

Health competency expresses itself through knowledge, beliefs, social norms, and the ability to act on these (i.e., the need to treat a child suffering from cough or fast breathing with the appropriate antibiotic).

Community capacity affects the sustainability of the production of health (i.e., the supply and demand of services) and the capacity of the local system to respond to challenges and make progress. The capacity of the community to organize itself to not only demand services, but also deliver and oversee these services. This is in line with Muller et al. (1988), who found that for the effective implementation of a community program, the implication and organization of the community was a priority.^{xxii}

Finally, social cohesion and social capital, which – although not directly linked to knowledge or the production of health per se – affect the resilience of the community, how it will support progress when change is needed, and how it will allow social support systems to thrive and community organizations to fulfill their roles. Another way to present this is that community capacity influences the climate in which changes and innovations are introduced and maintained at the local level. This is in line with the findings of Sen et al. (1999)^{xxiii} who in his book *Development as Freedom* states capacity building influences the changes and innovations introduced at local level.

Thus at the community level, the high degree of knowledge of all stakeholders has highly favored the implementation of the CCM process. Secondly, capacity building of both the district medical teams and the IHC chiefs was a cornerstone towards the realization of the program's objectives.

2. What are the effects of the introduction of CCM of pneumonia with oral antibiotics on:

a. Management of sick child?

Mortality due to childhood pneumonia is strongly linked to malnutrition, malaria, poverty, and inadequate access to health care. Consequently, more than 98% of pneumonia deaths^{xxiv} in children occur in 68 countries where progress in reducing under-five mortality is most critical (the “*Countdown to 2015*” countries).^{xxv} The burden that pneumonia places on families and the health system in low-resource countries in turn exacerbates inequalities; overwhelmingly,

children who are poor, hungry, and living in remote areas are most likely to be visited by this “*forgotten killer*.”^{xxvi} The introduction of CCM of pneumonia with oral amoxicillin will improve the management of the child illness. This can be demonstrated by the increase from 20.5% to 95.7% the percentage of sick children whose caretakers knew how to manage sickness at home and the increase from 2.43% to 45.26% the percentage of mothers who sought help from the community relays.

b. Community relays?

The implementation of the CCM process enabled the community relays and rendered them more effective in the execution of their duties. A majority of community relays interviewed at baseline were willing to participate in the CCM Process (82.2%). To further incentivize the community relays, the project embarked on advocacy with local partners (councils and community leaders) to develop suitable motivation mechanisms. Some communities have agreed to work on the farm of the community relay once a month, while in other communities there is a common basket in which each household saves a sum of 500frs CFA (~\$1.01 USD) for the motivation of the community relay. The result of this advocacy has led to a sharp decrease in the number of community relays that drop out of the program. Finally, the profits from the drug sales were shared between the community relay (3frs), the Health Area Chief (5frs) and the health district (2frs), and was found to be an important incentive for the community relays as well as the health district staff.

c. Health system?

The CCM process also strengthens health information systems due to the strong relationship developed between the District Office, the health center chiefs, and the communities via the community relays. A key informant discussion with the District Medical Officer of the Bafut Health District revealed that the community relays are not only used for the case-management of pneumonia, but also for other routine EPI activities such as vitamin A supplementation campaigns and the follow-up to ensure children who previously missed vaccinations are able to “catch-up”. Furthermore, the community relays are trained in community-IMCI and are involved in related activities by supporting the MOH in the early referral of severe cases of childhood illnesses. These relays were also trained on stock management, and process of renewing their stocks from the health centers themselves further strengthens the collaboration between the community and the health system.

3. What are the possible problems to be faced in the implementation of CCM of pneumonia and IMCI in general in Cameroon with respect to the following aspects:

a. Training of community relays

The selection of relays often presents a number of challenges; however, the project’s promoting a community-led selection process, either by election or nomination, led to more devoted and effective community relays than those who were made community relays because they were part of the Health Area Committee. This is likely due to the fact that the communities selected/accepted them, and were thus willing to cooperate with them. There may be a challenge of community acceptance of the relays, which could be solved by the provision of identification badges as recommended by the community relays.

b. Identification and treatment of pneumonia

There was no major problem in the identification of pneumonia since the community relays were using the WHO C-IMCI protocol which is relatively simple to apply. Even though only 54.2% knew at least two signs of severe pneumonia at the mid-term, looking at the final data, 95.6% of all relays knew at least two signs of simple and two signs of severe pneumonia. It suffices that the relay has a primary level of education, with the ability to read and write, to be able to apply the protocol. Looking at the treatment of pneumonia with oral amoxicillin, 98.9% knew how to correctly treat simple pneumonia signs in children 2-11 months, and 100% knew how to correctly treat simple pneumonia in children 12-59 months. This small difference may be accounted for by the fact that the IMCI protocol provides guidelines for the use of amoxicillin 250mg, but what the relays were given was amoxicillin 500mg. Taking this different dosage into account, there was a treatment guide added to the training on administration of the drug.

c. Reference and counter reference

Of the 26 relays that had to refer a child to the health facility, 21 of them (80.7%) knew how to correctly fill out the referral form. Secondly, a cross-section of the relays understood the referral and counter-referral system. The midterm evaluation highlighted that the majority of the relays who referred children to the health facility did not receive a counter-referral from the health facility. As a result, the project encouraged supervisory visits to the community relays and frontline health facility staff to focus on strengthening this aspect. Results show that of the 26 children referred, 24 (92.3%) community relays received a counter-referral.

d. Management of drug stocks

Drug stocks are managed by a special paper-based tool developed to track the quantities acquired and distributed per day and per month. This system allows the supervisor to monitor what quantities were present and if the quantities distributed are congruent with the number of cases administered. In the midterm evaluation, 75.9% of the community relays knew how to correctly complete their drug consumption checklists, and this percentage increased to 98.9% at end-line. On-the-spot training by supervisors played a major role in ensuring the proper management of drugs and the achievement of these results.

e. Data management

Community data collection and consolidation

The community relays were provided with a set of paper based tools to permit them track the number of cases they were receiving and also for the management of drugs. These tools were classified as follows:

- 1) **Drug consumption checklist:** This tool is a monthly calendar used by the community relays to record the number of patients received on a daily basis and the amount of drugs provided to these patients. At the end of each month, a monthly summary was captured in the monthly sheet.
- 2) **Reference and counter reference forms:** these are predesigned forms for the community relay to refer cases to the health facility and keep track of the number of cases referred.
- 3) **Community relay monthly summary:** this was designed to capture the morbidity of

malaria, pneumonia and diarrhea and also under 5 mortality in the community level.

See Annex A for the community monitoring tools.

This data consolidated at a monthly basis was sent to the health center chief who could have an appraisal of the health status of the community. This also helped the health center chief to follow up drug consumption and the cases referred by the community that did not get to the health facility. This also gave the health center chief the opportunity to tract the morbidity of malaria, Pneumonia and Diarrhea in the community.

Supervision

The supervision conducted by the Health center chief was guided by a supervision checklist developed by the project. See annex 2 for the community relay supervision guide.

4. What are the critical factors susceptible to positively or negatively influence the CCM of pneumonia by oral anti-biotherapy?

a. Price of oral amoxicillin 500mg

During the intervention, a tablet of oral amoxicillin 500mg was sold at 35 frs CFA (~\$0.07 USD), thus with 280 frs CFA (~\$0.56 USD) a mother could purchase a five-day course for a child of 2-11 months. For children of 12-59 months who receive $\frac{3}{4}$ tablets of amoxicillin 500mg three times daily for five days, 400 frs CFA (~\$0.81 USD) covers a full course of treatment. All service providers (community relays and health facility staff) and caretakers considered the price of oral amoxicillin affordable or cheap. The desire to see the child cured was the main motivating factor for the purchase.

Conclusions and recommendations

The price did not seem to be a limiting factor to antibiotic access or demand. The oral amoxicillin 500mg was considered affordable by a large majority of mothers and by all service providers. However, the selected price could limit access to treatment for a minority of children whose caretakers complained that they lacked any money for the purchase of antibiotics. It would be desirable to set prices such that they are not higher than those used for the pilot phase. Thus, **a tablet of amoxicillin 500mg should be made available to the population at the cost of 35frs CFA each, or 280 frs CFA for full course for children 2-11 months and 400 frs CFA for children 12-59 months.**

b. Dosage of amoxicillin used (250mg or 500 mg)

Prompt treatment of pneumonia with a full course of appropriate antibiotics is lifesaving. Taking into consideration the fact that the community implementer (community relays) are non-professionals, the variation in dosage of the oral amoxicillin may have a significant influence on the prescription of the right dose of oral amoxicillin to children 2-59 months. In accordance with the MoH protocol for the treatment of pneumonia with oral Amoxicillin, children 2-11 months are to receive 250mg tablets at a time and children 12-59 months are to receive 375mg at a time. During the study, the project used amoxicillin 500mg tablets and found out that the community relays were able to prescribe the right dose after training and supervision despite needing to properly cut the tablet to the correct dosage. Results show that

89 of the 90 community relays were able to correctly prescribe oral amoxicillin 500mg to children 2-11 months and all 90 community relays were able to correctly prescribe oral amoxicillin 500mg to children 12-59 months. To test if the posology of the drug has an influence on the prescription of the right dose of oral amoxicillin, during the supervisory visit in May 2010, 10 randomly selected community relays were given amoxicillin 500mg to demonstrate how they will administer this to children. Of these, 7 gave the correct demonstration, 2 demonstrated rightly after consulting their “*Caring for the sick child Manual*” and 1 could not give the right demonstration. This is an indicator that the presentation of the drug may have an influence on the prescription of the right dosage.

Conclusions and recommendations

Though 70% of the community relays could correctly prescribe oral amoxicillin 250mg, in case the dosage of the drug is changed, refresher training is necessary to ensure that the right dose is prescribed to the right target group.

The MOH should therefore ensure that in the scale-up of the CCM process, a unique dosage of oral amoxicillin is used.

c. Perception and risk linked to oral amoxicillin administration

The side effects of oral amoxicillin include nausea, vomiting, and dizziness in children 2-59 months. The perception of some risks linked to the administration of a drug can influence its acceptance and/or the adherence to prescriptions (i.e., dose and duration). During the home visits carried out by community relays, no mother complained of any side effects. Many of them stated that they had no problems with their child taking the drug. Similarly, frontline health facility staff did not record any complaints from parents or observe any side-effects from the drugs, stating that they had been prescribing the drug for a long-time and had experienced no complaints. The symptoms indicated as side effects of oral amoxicillin such as vomiting, dizziness, or nausea are all danger signs requiring the individual to seek care from the health facility. In this study, no patients treated with oral amoxicillin complained of any of the above signs.

Conclusions and recommendations

The majority of caretakers and health staff did not perceive any problems in the use of oral amoxicillin for the treatment of simple pneumonia. The few problems indicated were danger signs for severe pneumonia including convulsions, fatigue/dehydration, fever, and lack of appetite. For these cases, it is essential for the individual to seek care from the health facility. **Mothers’ awareness of the danger signs of pneumonia and the need to seek immediate care from the health facility should be stressed during sensitization meetings or consultations.**

d. Preparation and administration of oral amoxicillin

The oral amoxicillin tablets do not quickly dissolve in water or milk, and thus need to be crushed and mixed with the liquid. It is also possible to administer directly into the mouth of older children. These methods of preparation and administration recommended were used in 94% of cases.

The other methods of administration including dilution in complementary food, in a glass/cup, or with other medication present risks of a child not taking the full dosage due to failure to

finish the drink or if they refuse because of the taste. The greatest challenge in giving the right dosage to children was due to difficulty in breaking the tablets, which was overcome by the community relay demonstrating the proper method to the mother.

Conclusions and recommendations

Oral amoxicillin was prepared and administered correctly by the majority of mothers (92%). However, it should be noted that there was the unnecessary practice of crushing the zinc tablet. One woman indicated a preference for syrup for a child 0-6 months. It is highly recommended that community relays **demonstrate preparation methods and the administration of the oral amoxicillin to the mother while preparing the first dosage with her. Accompanying educational messages must also explain the process.**

e. Factors that can limit access to oral amoxicillin

One of the key issues the program sought to identify is the access to oral amoxicillin by mothers of children 2-59 months. Thus it was important to find out from the mothers what were the barriers to accessing oral amoxicillin on time. During the study period, it was noticed that the factors that are most susceptible to influencing access to oral amoxicillin are stock depletions and mothers’ ability to remember to obtain the drug.

Table 11: Proportion of Mothers whose children missed a dose of amoxicillin

	BASE LINE	MID TERM	FINAL
	Number of respondents (n=4)	Number of respondents (n=13)	Number of respondents (n=96)
Stock depletion of amoxicillin	2/4	3/13	2/96
Expensive amoxicillin	¼	1/13	4/96
Forgot	¾	13/13	19/96
Long distance to the community relay	¼	2/13	3/96
Ignorance	¼	6/13	1/96
I traveled	2/4	9/13	8/96
Health problem	¾	3/13	4/96
No oral amoxicillin available	¼	1/13	1/96
Side effects	0/4	3/13	1/96
Community relay unavailable	0/4	2/13	3/96

Conclusions and recommendations

The stock depletions of oral amoxicillin for the treatment of pneumonia and mothers forgetting are important factors that can limit the access of children to this treatment. As a result, **IHC chiefs and community relays should use other avenues like vaccinations, outreach, antenatal care (ANC) visits, and other campaigns to sensitize mothers; and a system for regular replenishment of supplies for each distribution network (health facility and community relay) should be put in place.**

f. Community involvement in the whole process, particularly in the selection of community relays

Community participation in the implementation of the program was essential. The involvement of community leaders, local authorities, and IHC chiefs motivated the community to participate. Discussions with stakeholders during the mid-term evaluation and supervisory visits showed that a majority of mothers abide by the treatment because they participated in the selection of the community relay.

Table 12: Methods of Involvement of Relays in CCM Process

How community relay got involved in the CCM process	Appointed by the community	65	72.2%
	As a member of the Health Area Committee	5	5.6%
	By community election	20	22.2%

Conclusion and recommendations

The involvement of community leaders in the selection of the community relay will enhance the adherence of the community member to the program. **Community relays should not be appointed by the health staff but should be selected in a participatory manner by the community, health staff, and community leaders.**

g. Provision of identification badges for the community relays

The community relays themselves have recommended the provision of materials such as umbrellas/rain coats, identification badges, and security boxes (small boxes where the community relays pack their drugs and documents) for the new relays who did not receive them. These materials will help the relays properly store the drugs. ID badges would be proof that the relays are working for the MOH and are different from the other drug vendors in the community. Finally, umbrellas/rain coats will help the community relays conduct home visits even during rain.

Table 13: Recommendations from the Community Relays

Recommendations from community relays	Motivation should be provided	5	20.8%
	Identification badges should be issued	10	41.7%
	Regular refresher courses should be organized	4	16.7%
	Material (drugs, umbrellas, security boxes should be made available)	5	20.8%

Conclusion and recommendations

The provision of the common needs of the community relays will favor the implementation of the CCM of pneumonia. In the implementation of the CCM of pneumonia, **provision of necessary materials for the community relay is a priority. These materials should include**

all documentation, security boxes, and umbrellas.

h. Participation of all health personnel in regular supervision of community relays

It was noticed that there was integrated supervision of the community relays, where the IHC chief includes follow-up of the activities of the community relay in his work plan for the month. This close relationship allowed the relays to be aware of other health activities such as the Mother and Child Health Nutrition Action Week (MCHNAW), CDD, Polio campaigns and other outreach services. Results show that 80% of the supervision was done by the IHC chief, thus demonstrating that community relays can be adequately supervised by trained IHC chiefs. **Supervision of community relays should be included in the minimum performance indicators of the IHC chiefs trained on Community IMCI.**

VII. PROGRAMMATIC IMPLICATIONS

The CCM protocol will require investments in strengthening the technical and managerial capacity of health facility personnel to promote quality service provision and management of the health facilities and community relays. These investments should include the organization of refresher courses on C-IMCI and the CCM of pneumonia. Short-courses to update the knowledge of frontline health staff on advances in the medical field and child care practices will also need to be organized.

The CCM protocol will support the districts in supervising the community relays and the health center staff on a frequent and regular basis. The Health Area Chief will likewise supervise the community relays and organizations that are actively involved in child survival activities. The program will promote the empowerment of community-based organizations and activities that can act as a catalyst in increasing the scope and acceptability of CCM activities in the program area and beyond. Technical materials essential for carrying out CCM activities will be provided whenever possible for health facilities in need. Finally, priority will be given to the availability of oral amoxicillin tablets and a sanitary working environment at health facilities and for community relays.

VIII. CONCLUSION

Looking at the specific objectives of the study, we have reached the following conclusions:

- At the community level, the high degree of knowledge of all stakeholders has favored the implementation of the CCM process.
- Capacity building of both the district medical teams and the IHC chiefs was a cornerstone towards the realization of the program's objectives.
- The introduction of CCM of pneumonia with oral amoxicillin improves the management of the child's illness

- The price of oral amoxicillin did not seem to be a limiting factor to antibiotic access or demand. The 500mg oral amoxicillin was considered affordable by a large majority of mothers and by all service providers
- In case the dosage of the drug is changed, community relays will be able to correctly prescribe oral amoxicillin after refresher training or increased supervision.
- The majority of caretakers and health staff did not perceive any problems in the use of oral amoxicillin for the treatment of simple pneumonia
- The Community IMCI process generally, and the CCM of pneumonia in particular, according to the new WHO protocol, has been documented in this operations research report.
- The Community IMCI process is very effective at the community level, looking at the coverage obtained after three months of implementation. In the present study, effectiveness is measure by the number of people treated and compliance with the study interventions. This report's findings demonstrate that the CCM of pneumonia in U5 children is cost effective and contributes to alleviating excessive expenditures by families.

IX. LESSONS LEARNED

9.1. Three Strategies to Reduce Pneumonia Mortality

In addition to preventive interventions such as routine vaccination, exclusive breastfeeding, and complementary feeding, three main treatment strategies that rely on community capacity development can reduce pneumonia mortality in developing countries:

- **Improving quality of care at first-level public health facilities** and ensuring they are financially, logistically, and geographically accessible. Even then, there may be barriers preventing parents from using the facilities. In this present study, health areas that had IHC chiefs trained on C-IMCI presented lower morbidity rates than health areas whose IHC Chiefs were not trained (newly recruited).
- **Improving quality of care in the private sector.** Looking at the prevalence of pneumonia in the health areas where there was primarily a private health care facility and comparing with other areas, we noticed that the prevalence did not change across time. Thus the improvement of the quality of care provided in the private sector (involvement of private health facilities in the training) will ameliorate the case management of the disease. In many settings, especially in urban areas, children are often treated in the private sector. Although active collaboration between the public and private sector is a relatively new strategy, and there is no conclusive evidence showing which approach is most effective, interventions involving private practitioners should continue to be pursued.
- **Increasing access to quality care can be achieved through community-based care.** Community health workers can be trained to assess sick children for signs of pneumonia; select appropriate treatments; administer the proper dosages of antibiotics; counsel parents on how to follow the recommended treatment regimen and provide supportive home care; and follow up with sick children and refer them to a health

facility in case of complications. In this study, the proportion of community relays that carried out home visits was 87.7%.

9.2 Use of Antibiotics at the Community Level

Health specialists are often concerned about whether antibiotics can be safely given in the community, specifically:

- Can community health workers classify and differentiate among conditions requiring antibiotic treatment?
- Can they dispense antibiotics appropriately?
- Do caregivers provide children with the full course of treatment?

When children suffering from pneumonia are treated promptly and effectively with antibiotics, their chances of survival increase significantly. Early intervention studies and subsequent research show that case management by community health workers has a significant impact on both overall and pneumonia specific under-five mortality. A recent meta-analysis^{xxvii} of community-based pneumonia case management studies estimated a 20% reduction in all-cause under-one mortality, and a 24% reduction in all-cause under-five mortality. This study shows that community health workers can effectively manage uncomplicated pneumonia in the community. The case-management activities performed included classifying respiratory infections based on respiratory rates and lower chest indrawing, treating non-severe pneumonia with antibiotics, and referring severe pneumonia cases where necessary.

This study and other community-based programs that treat pneumonia have shown that monitoring the quality of care to ensure that antibiotics are being used appropriately is effective and feasible. In this study, the quality of care is monitored through record reviews and direct observation of community-based workers' assessment and treatment of sick children.

Approaches to promoting the appropriate use of antibiotics in the community, including adherence to treatment regimens in the home, need further evaluation. In community-based malaria programs, providing caregivers with clear, illustrated instructions describing the required drug regimens has improved compliance. Pre-packaged antibiotic treatment or blister packs, which contain the full drug regimen, may be an effective strategy to increase appropriate dispensing practices and facilitate adherence to treatment at home. Adherence may also improve if community health workers counsel caretakers on the importance of taking the full course of antibiotics. Ongoing evaluations and operational research will help identify and improve strategies that encourage the appropriate use of antibiotics and improve access to quality care.

9.4 Integrated Supervision by IHC Chiefs Improves CCM Pneumonia Treatment Activities

The proportion of community relays that had a supervisory visit in the last month was 69.9%, with the majority of these supervisions being conducted by the IHC chiefs (66.27%), demonstrating that integration of supervision of the community relays' activities with the

monthly work plan of the IHC chief greatly improved results. Secondly, the participation of the IHC chief leads to increased sustainability since no external support was given to the chiefs for supervision.

9.5 Partnership with Community-Based Organizations is a Major Strength

The communities' acceptance of the program can be attributed to the presence of community-based organizations (CBOs) trained on Community IMCI. These organizations are now fertile soil for education and sensitization on CCM activities. These CBOs will contribute to:

- Improving care practices such as recognition of signs and symptoms, knowing when and where to seek care, compliance with treatment and recognition of danger signs;
- Developing effective communication or information, education and communication strategies related to family and community practices; and
- In areas where IMCI activities are being conducted, integrating community capacity development for pneumonia with community IMCI programming.

Annex A. Community Monitoring Tools (pdf file attached)



End Notes

- ⁱ Sazawal S and Black RE. Meta-analysis of intervention trials on case management of pneumonia in community settings. *Lancet* 1992; 340: 528-33.
- ⁱⁱ Winch P.J., Gilroy K. E., C. Wolfheim, Starbuck E.S., Young M.W., Walker L.D. AND Black R.E. Intervention models for the management of children with signs of pneumonia or malaria by community. *Health workers*. 2005;20:199-212.
- ⁱⁱⁱ OMS/UNICEF. Déclaration commune OMS/UNICEF. Prise en charge de la pneumonie dans les communautés. [http://www.coregroup.org/ccm/WHO UNICEF Joint Statement Management Pneumonia Community Settings French.pdf](http://www.coregroup.org/ccm/WHO_UNICEF_Joint_Statement_Management_Pneumonia_Community_Settings_French.pdf). 2004.
- ^{iv} Marsh D.R., Gilroy K.E, Van de Weerd R.; Wansi E., and Qazie S. Community case management of pneumonia: at a tipping point? *Bull World Health Organ*. 2008 May; 86(5): 381–389
- ^v Community case management of pneumonia: at a tipping point? David R Marsh,^a Kate E Gilroy,^b Renee Van de Weerd,^c Emmanuel Wansid & Shamim Qazie, *Bulletin of the World Health Organization* 2008;86:381–389.
- ^{vi} Sylla, 2007 archives pédiatrie Bang
- HADI diagnosis of pneumonia by community health worker Mulholland pneumonia mortality lancet 2007
- ^{vii} Unicef/WHO pneumonia the forgotten killer of children 2006. Kelly *American journal of public health* 2001, community health performance
- ^{viii} WHO Cameroon mortality Fact sheet 2006.
- ^{ix} direct communication with the teaching pediatricians of the Faculty of Medicine and Biomedical Sciences (FMBS)
- ^x Greenwood B. Epidemiology of acute lower respiratory tract infections, especially those due to *Haemophilus influenzae* type b, in The Gambia, west Africa. *Journal of Infectious Diseases*. 1992;165 Suppl 1:S26-8
- Simoes E.A.F., Cherian T., Chow J., Shahid-Salles S., Laxminarayan R. and John T.J. *Acute Respiratory Infections in Children* 2006. Chapitre 25: 483-497
- Shann F, Gratten M, Germer S, Linnemann V, Hazlett D, Payne R. Aetiology of pneumonia in children in Goroka Hospital, Papua New Guinea. *Lancet* 1984; ii: 537-41
- ^{xi} Winch P.J., Gilroy K. E., C. Wolfheim, Starbuck E.S., Young M.W., Walker L.D. AND Black R.E. Intervention models for the management of children with signs of pneumonia or malaria by community. *Health workers*. 2005;20:199-212
- ^{xii} Black R.E., Morris S.S., Bryce J. Where and why are 10 million children dying every year? *Lancet* 2003 (361),9376:2226 – 2234.
- Sazawal S and Black RE. Meta-analysis of intervention trials on case management of pneumonia in community settings. *Lancet* 1992; 340: 528-33
- OMS/UNICEF. Déclaration commune OMS/UNICEF. Prise en charge de la pneumonie dans les communautés. [http://www.coregroup.org/ccm/WHO UNICEF Joint Statement Management Pneumonia Community Settings French.pdf](http://www.coregroup.org/ccm/WHO_UNICEF_Joint_Statement_Management_Pneumonia_Community_Settings_French.pdf). 2004
- Mtango F.D. and Neuvians D. Acute respiratory infections in children under five years. Control project in Bagamoyo District, Tanzania
- ^{xiii} Sazawal S and Black RE. Meta-analysis of intervention trials on case management of pneumonia in community settings. *Lancet* 1992; 340: 528-33
- ^{xiv} OMS/UNICEF. Déclaration commune OMS/UNICEF. Prise en charge de la pneumonie dans les communautés. [http://www.coregroup.org/ccm/WHO UNICEF Joint Statement Management Pneumonia Community Settings French.pdf](http://www.coregroup.org/ccm/WHO_UNICEF_Joint_Statement_Management_Pneumonia_Community_Settings_French.pdf). 2004
- ^{xv} Mtango F.D. and Neuvians D. Acute respiratory infections in children under five years. Control project in Bagamoyo District, Tanzania
- ^{xvi} Winch P.J., Gilroy K. E., C. Wolfheim, Starbuck E.S., Young M.W., Walker L.D. AND Black R.E. Intervention models for the management of children with signs of pneumonia or malaria by community. *Health workers*. 2005;20:199-212
- ^{xvii} World Health Organization, & United Nations Children’s Fund. (1978). Primary health care. Paper presented at the International Conference on Primary Health Care Alma-Ata, USSR, September 6-12, Geneva and New York
- ^{xviii} World Health Organization. (1992). The Ottawa charter for health promotion. *WHO Regional Publications, European Series, 44*, 1-7.
- ^{xix} Winch, P. J., LeBan, K., Casazza, L., Walker, L., & Percy, K. (2002). An implementation framework for household and community integrated management of childhood illness. *Health Policy Plan*, 17, 345-353.
- ^{xx} Senge, P. (2006). *The fifth discipline: The art and practice of the learning organization*. New York: Random House.
- ^{xxi} Available at <http://www.jhuccp.org/training/scope/starguide/begin.swf>.

^{xxii} Rifkin, S. B., Muller, F., & Bichmann, W. (1988). Primary health care: On measuring participation. *Social Science and Medicine*, 26(9), 931-940. Also see: Sarriot, E. (2002). *Sustaining child survival: Many roads to choose, but do we have a map?* Calverton, MD: Macro International Inc. Available at http://www.childsurvival.com/documents/CSTS/csts_new.pdf.

^{xxiii} Sen, A. (1999). *Development as freedom*. New York: Random House.

^{xxiv} The percentage of total pneumonia deaths occurring in the 68 countries was estimated based on (year 2000) data on mortality among children under five years of age due to pneumonia (%) from WHO *World Health Statistics 2008* and births per year from UN population division 2008 projections.

^{xxv} UNICEF. *Countdown to 2015. Tracking progress in maternal, neonatal and child survival: the 2008 report*. New York, UNICEF, 2008

^{xxvi} UNICEF and WHO. *Pneumonia: the forgotten killer of children*. New York, UNICEF, 2006

^{xxvii} Community case management improves use of treatment for childhood diarrhea, malaria and pneumonia in a remote district of Ethiopia; Tedbabe Degefie¹, David Marsh², Abebe Gebremariam³, Worku Tefera⁴, Garth Osborn⁵, Karen Waltensperger⁶; [*Ethiop. J. Health Dev.* 2009;23(1):120-126]

ANNEX 12. Special Reports – Introduction of Zinc for the Treatment of Diarrhea

Helen Keller International/Cameroun



**RESULTS OF OPERATIONAL RESEARCH ON THE
INTRODUCTION OF ZINC FOR THE TREATMENT OF
DIARRHEA IN CAMEROON**



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LIST OF ABBREVIATIONS

ORS: Oral Rehydration Salt

ORT: Oral Rehydration Therapy

CBO: Community Based Organization

CENAME: Centre National d'Approvisionnement en Médicaments Essentiels

ACMS: Association Camerounaise pour le Marketing Social

I- INTRODUCTION

This document presents a synthesis of data collected during operational research on the use of zinc for the treatment of diarrhea in Cameroon. This was a pilot research intervention carried out in the Bertoua Health District of the Eastern province between August 2007 and February 2008. The research was conducted under the leadership of Helen Keller International (HKI) within the framework of the "Bundled Expanded Impact Child Survival Project" funded by USAID in the Bertoua Health District.

The treatment protocol examined is a 10-day course with dispersible (in water or milk) zinc tablets (procured from Nutriset) provided during and after diarrhea episodes to children less than five years of age. The WHO/UNICEF 2004 joint statement on the management of childhood diarrhea recommends that in addition to oral rehydration therapy children under 6 months of age receive 10mg per day for 10-14 days (or half tablet of 20mg) and children 6-59 months receive 20mg per day for 10-14 days. This recommendation followed research findings that zinc supplementation for the management of diarrhea was associated with a 25% reduction in the duration of acute diarrhea, a 25% reduction in the incidence of diarrhea and a 36% reduction in the incidence of malaria over 2-3 months following treatment. Use of zinc had also been shown to increase the use of oral rehydration salts (ORS) (by approximately 25%) and reduce the inappropriate use of antibiotics (by approximately 20%).

During this research, zinc tablets and ORS were distributed through 16 health facilities and community-based organizations (CBOs) participating in the project in 12 villages of 10 Health Areas.

II- RESEARCH OBJECTIVES

The general objective of the operational research was to facilitate the introduction of zinc in the management of diarrhea in children of less than 5 years in Cameroon.

The specific objectives of the research were to:

1. Determine the best mechanism for introducing zinc for the treatment of diarrhea;
2. Assess the impact of the use of zinc in the treatment of diarrhea on the use of ORT/ORS, antibiotics and other frequently used anti-diarrhea drugs;
3. Identify the main determinants of acceptance, compliance with and completion of the full course of zinc by caretakers at home;
4. Identify the most suitable means for disseminating messages for promoting zinc for the treatment of diarrhea.

The results will subsequently be applied to the design, testing and then production of educational materials to promote the joint use of ORS/Zinc in the treatment of diarrhea.

III- METHODOLOGY

Several approaches were used to collect data. Two cross-sectional quantitative surveys targeting caretakers of children with diarrhea were carried out: one before the intervention (introduction of zinc treatment) and the other five months later. Qualitative tools (in-depth interviews) were used with caretakers of children and health service providers (health personnel, community volunteers and participating community-based organization members). There was also home follow-up of

mothers who had received zinc for the treatment of diarrhea to examine compliance with treatment. Other information for this report was derived from monitoring/supervision of the different actors and a behavioral (doer/non-doer) study on compliance to treatment.

III.1 Quantitative surveys:

This element involved cross sectional baseline and end line surveys: in each case of a sample of 190 mothers whose children had suffered from diarrhea in the two weeks preceding the survey were selected. Information was collected on the following indicators:

- ORS/ORT use to treat acute diarrhea episodes in their children,
- use of zinc in the treatment of diarrhea,
- use of antibiotics and anti-diarrheal drugs during a diarrhea episode,
- source for care in the treatment of diarrhea and the reasons for seeking treatment in those places;
- knowledge of the treatment of diarrhea with ORS and zinc;
- feeding practices during a diarrhea episode;
- source of exposure to the intervention (medical or community network);
- opinion on the cost of treatment of diarrhea with ORS and zinc.

III.2 Doer/Non-doer Analysis

This element was designed to:

- identify the main determinants of compliance with and completion of the zinc treatment of a diarrheal episode;
- identify the main determinants of seeking care from a health facility; and
- inform strategies to minimize barriers to the new treatment and promote the positive health care behaviors while scaling up this treatment at the national level.

The sample for each question included 30 doers (those who ensured their children completed zinc treatment) and 30 non-doers, and the two groups were compared in relation to various factors influencing adoption of the behavior; perceived self-efficacy (belief in one's capacity to perform a new behavior) in implementing the recommended behavior; and perceived social acceptability (belief that one's community approves of the new behavior).

III.3 Qualitative Research

The objectives of this element were to:

- examine the range of home practices used for the treatment of diarrhea in young children;
- examine the factors that impel caretakers of children with diarrhea to seek treatment outside of the home (facilitating factors) and reasons for not seeking treatment (barriers);
- describe the sources of treatment for diarrheal diseases (health facility, community network, traditional healers, informal sector drug sellers, etc.);
- examine caretakers' and health service providers' perceptions of ORS and zinc tablets for the treatment of diarrhea;
- assess caregivers' performance in the management of diarrhea,
- identify features associated with the zinc tablets such as taste, appearance and beneficial effects that could help inform the future large scale marketing of zinc tablets;

- examine the prevalence and appeal of non-recommended treatment practices for uncomplicated diarrhea (antibiotics, injections, anti-diarrhea drugs, laxatives, etc.)

Qualitative research involved in-depth interviews with service providers (health staff and community agents), mothers and the participating women's association members.

III.4 Home follow-up

Home visits were made to 135 mothers whose children were on a diarrhea treatment and data collected on:

- the quantity of zinc and ORS prescribed;
- the quantity of zinc and ORS purchased;
- the quantity of zinc and ORS used;
- the number of days of zinc treatment given;
- the prescription and use of antibiotics and "anti-diarrhea" drugs;
- the attitude of caregivers in relation to the management of diarrhea in children;
- the techniques of preparation and administration of zinc and ORS;
- difficulties associated with the administration of zinc and ORS;
- risks perceived by parents following the administration of zinc.

IV- INTERVENTION DESCRIPTION

The pilot interventions that were put in place after the baseline survey consisted of the following:

4.1 Policy Advocacy. This was aimed at securing the approval of the MOH for the use of zinc as an essential element in the management of diarrhea in children below five years in Cameroon.

4.2 Capacity building of the different actors. Forty two health staff and 225 members of village health committees or Community-Based Organizations (CBOs) from all the health areas of the Bertoua health district were trained on the use of zinc for the management of diarrhea in children.

4.3 Provision of Zinc and supplies. The different structures (CBOs and health facilities) were supplied a consignment of zinc blisters and quantities of ORS. In all, 1,720 courses of zinc (10 dose, 20-mg zinc blister packs) and 500 ORS sachets were deployed to the different frontline health providers examined by the research arm of the project.

4.4 Communication for behavior change. Various channels of communication were used, notably interpersonal communication by trained service providers or community members, health education sessions held in health facilities and village associations, and radio broadcasts.

4.5 Treatment protocol. The training recommended the following treatments for diarrhea:

- Advice on increased breastfeeding and, for children >6 months, increased feeding and fluid intake during diarrhea;
- Use of zinc for the treatment of diarrhea along with ORS for children >6 months.

The treatment was offered through two networks:

- Health facilities (16): Mbethen Integrated Health Center (IHC), Mokolo I IHC, Ghent Boulaye IHC, Moindi IHC, Moundi Catholic Health Center (HC), Belabo Catholic HC, Belabo Medicalised Health Center (MHC), Nkolbikon Catholic HC, Tigaza Catholic HC, Mokolo IV Catholic HC, Bertoua Lutheran HC, Mandjou Community HC and the Bertoua Provincial hospital.
- CBOs (12): Boulembe (Défense-Enfant), Mboulaye 1 (Essayons-voir), Daigne (Temo Wete), Mbeth 2 (Femmes Dynamiques), Yanda 1 (Solidarité), Dongo (Amour et Confiance), Dimako (Cercle Familial de Dimako), Andom (Amour et Solidarité), Mbelle Panga (Oyili Nama), Mbang 1 (CEFAS), Yoko Betougou, Ekombitié, Yanda 2 (Femmes Dynamiques et Entente).

4.6 Monitoring and evaluation. The evaluation compared behaviors at baseline and at the end of the intervention (endline). Monitoring/supervision missions of health agents were carried out every month and a home follow-up survey was conducted.

This report presents the findings as well as conclusions and recommendations.

V-MAIN RESULTS

The main results are derived from analysis and synthesis of the different data sources. This section presents the results of advocacy and sensitization efforts, then reviews the analyses relating to the five research objectives.

5.1 ADVOCACY

Advocacy with government partners to promote zinc treatment for diarrhea began with project start-up; the government incorporated this treatment protocol into the National Nutrition Policy and Program documents developed in December, 2006. In January 2008, zinc was added to the list of essential drugs. Administrative procedures for importing the first stock of zinc are underway in the National Drug Procurement Center.

In addition, clinical IMCI training modules have recently been revised to incorporate recommendations for zinc treatment for diarrhea. Revision of community IMCI training modules is still pending. Zinc treatment was also included in the nutrition training curriculum for Cameroon's paramedical training schools, as part of the essential nutrition actions under the topic, "Feeding sick or severely malnourished children."

Scientific meetings, congresses and other workshops were used as forums for advocacy with other actors and/or partners. For instance, during the 10th Congress of the Cameroon Pediatrics Society, the EIP project (HKI) made a presentation on the subject. The issue was also raised during planning and review workshops of the Cameroon-UNICEF cooperation program, particularly in relation to the programs serving Central African and Chadian refugee children in Cameroon. UNICEF has agreed to support reproduction and diffusion of the national protocol for zinc supplementation in diarrhea in the second semester of 2008.

CONCLUSIONS AND RECOMMENDATIONS

In Cameroon, Zinc is on the list of essential drugs but not yet available in the market (public and private health facilities). Thus **continuing advocacy is needed to accelerate procurement**, notably through CENAME and/or PSI/ACMS.

Outside the pilot zone, service providers are still unaware of this new treatment protocol. Thus partners must **mobilize necessary resources for the training of service providers and for the development and production of communication tools that must support this training.**

5.2 INTRODUCTION OF ZINC TREATMENT

The use of zinc for the treatment of diarrhea was introduced through health facilities and the CBOs. Commercial pharmacies were identified in the research protocol but refused to participate.

Of the 190 mothers interviewed at baseline, 81 sought treatment from diarrhea at health centers and 11 sought treatment from CBOs (92 did not seek treatment). For children <6 months of age, none presented at CBOs; at health centers the correct zinc prescription was given in 62% of cases presenting. For children of 6-59 months of age, CBOs the correct zinc prescription was given in 100% of cases; health staff gave the correct prescription in 99% of the cases. However overall, zinc was prescribed in only 38% of cases presenting with diarrhea, while combined zinc/ORS treatment was prescribed in only 37% of all cases of diarrhea. Health workers missed the opportunity to prescribe zinc in 67% of children presenting with diarrhea; CBOs did not miss any cases but received only 11 relevant consultations.

Table N° 1: Zinc and ORS utilization rate according to the place of treatment

Place of treatment (sample n refers number of diarrhea cases)	Use rate		
	ORS	Zinc	ORS/Zinc
Health facility (n=81)	66.7%	29.6%	29.6%
CBO (n=11)	90.9%	100%	90.9%
Total	69.6%	38%	36.9%

Source: Quantitative survey

The performance of CBOs suggests they may be reliable sources of counseling in and provision of zinc for the management of diarrhea at the community level; however, the sample size was quite small (n=11).

Overall 70% of patients of health clinics completed the 10-12 day course of zinc whereas 52% of the patients of CBOs completed the full course.

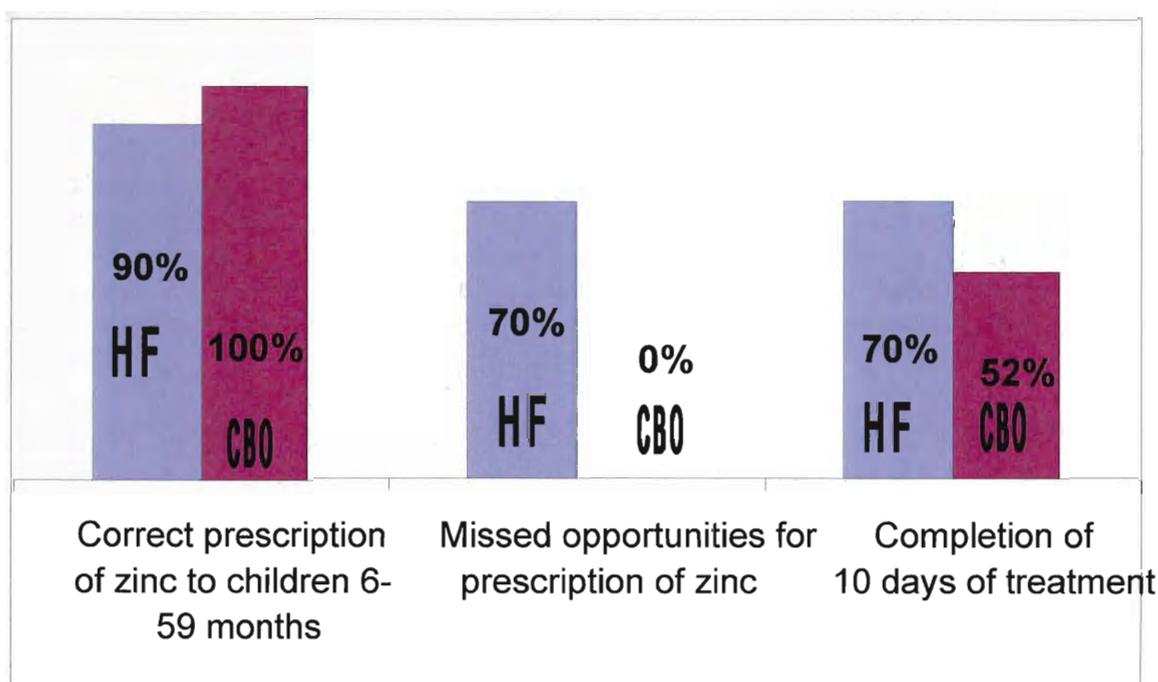
CONCLUSIONS AND RECOMMENDATIONS

On the whole, both the health and CBO staff prescribed zinc correctly for children of 6-59 months, although missed opportunities were higher than optimal. CBOs are more accessible to the population than health facilities, and although the completion rate was higher among children seen at the health facility than those consulting the CBOs, making zinc available through the CBOs reduced the median delay in seeking treatment (3 days after the onset of symptoms for the

health facility vs. 2 days for the CBOs). **The delay between the beginning of diarrhea and seeking of treatment at suitable places is still too long, and should be addressed by the communications strategy.**

Since the action of the two networks is complementary, during the scaling up, **we recommend using both while addressing the shortcomings of each through training and communication. It is preferable to involve the commercial pharmacies as well, as more than 10% of mothers sought treatment for diarrhea directly from pharmacies.**

Figure N°1: Rates of correct prescription, missed opportunities for prescriptions, and completion of treatment at health facilities (HF) and community-based organizations (CBO)



CONCLUSIONS AND RECOMMENDATIONS (cont)

As the primary source of money for treatment, men have an important influence over this care seeking behavior (61% of fathers vs. 28% of mothers finance treatment), although it is often the mother who takes action. **Thus the communications strategy addressing the management of childhood diarrhea must target fathers.**

Monitoring/supervision missions revealed that some CBOs sell zinc without the ORS, whereas exit interviews revealed that some health staff sell ORS without the zinc. **To change this practice, a “diarrhea treatment kit” should be conceived, containing, for example:**

- 1/2 of a 20 mg package of zinc (or 1 package of 10mg) + 2 ORS sachets for children of less than six months;
- 1 package of 20 mg of zinc + 2 ORS sachets for children of 6 to 59 months.

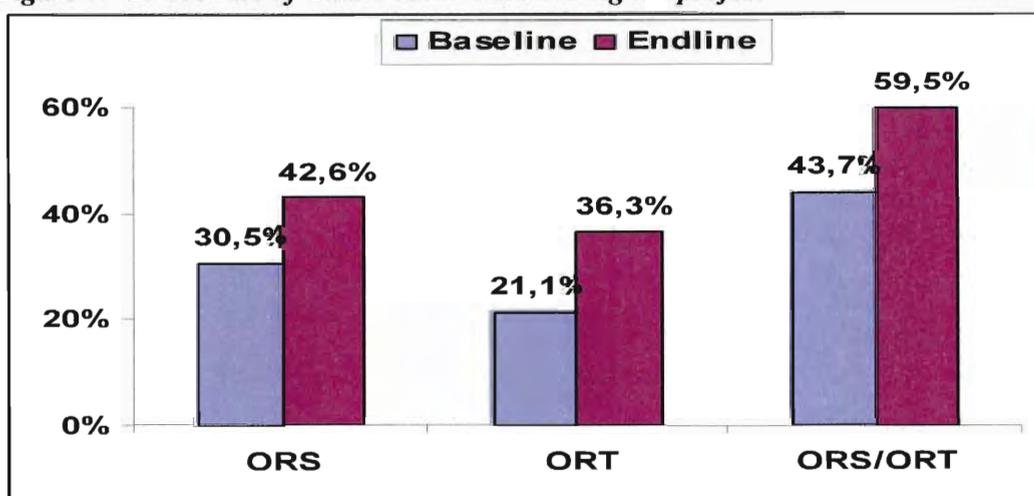
This kit could well be sold in Cameroon through the same channel as that of the “Malaria treatment home kit”.

The two networks achieved a relatively satisfactory treatment completion rate (67%) even though it remains lower than that observed in a Malian survey (89%). Evidence also suggests that higher completion rates for the minimum 10-day treatment are achieved when the dose promoted is 14 days. Therefore, we recommend a **14-day treatment be promoted in order to maximize completion of at least 10 days of treatment. Further studies should be carried out to examine treatment adherence after scale up.**

5.3 IMPACT OF ZINC INTRODUCTION ON THE USE OF ORT/ORS, ANTIBIOTICS ANTI-DIARRHEA DRUGS.

The promotion of zinc and ORS/ORT for the treatment of diarrhea increased the use of ORS/ORT. The figure below shows the use rates both for baseline and endline surveys.

Figure N° 2: Use rate of ORS and /or ORT during the project



In the project zone, the use of ORS or ORT at end line was nearly three times the rate observed in the province in 2004 (20%).

In spite of the improvement of the use of ORS/ORT, the frequency of administration of supplementary liquids and feeding during diarrhea remained low. The proportion of mothers who gave more fluids to their children during diarrhea episodes also is low (46%); indeed the proportion is lower than that observed in 2004 (66%) and in 1998 (83%) in the Eastern province. This suggests there has been a decline in the appropriate feeding of the sick child.

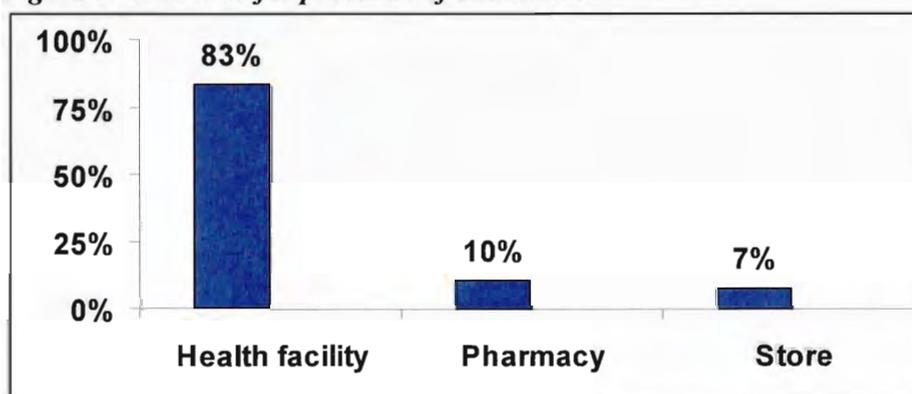
In the management of diarrhea, antibiotics should be prescribed for children suffering from bloody diarrhea (dysentery). It was only possible to assess the appropriate use of antibiotics if these medications were available/visible at the time of the surveys.

Seven percent of the sample of children had diarrhea with blood; antibiotics were used correctly in 11% of cases. Ninety-two percent of children with diarrhea had no blood; 94% of the doses of antibiotics observed were taken by children without bloody diarrhea. It is worth noting that the children often presented several symptoms, some of which might justify the use of antibiotics. This operational research was not able to examine these confounding factors.

The health facility remains the main source for antibiotics (Figure 3).

The proportion of children with diarrhea given anti-diarrhea drugs was 0% and 6% at baseline and end line, respectively. The health facility pharmacy is the main source for the purchase of such treatments.

Figure N°3: Source for purchase of antibiotics



CONCLUSIONS AND RECOMMENDATIONS

The intervention led to an improvement of the use of ORS and/or ORT. Nevertheless, 54% of children did not receive increased fluids during the last episode of diarrhea, and appropriate feeding appears to have declined over time. Therefore, **it is necessary to elaborate and implement a communications plan for the treatment of diarrhea taking into account the four rules of managing simple diarrhea.** The promotional messages and instructions of managing diarrhea must also clearly indicate that antibiotic therapy is only recommended for diarrhea with blood. The use of anti-diarrhea drugs is rather rare.

Reducing the appropriate prescription of antibiotics will require pre- or in-service training of the health staff and pharmacists, who provide most of the prescriptions. **Thus, all future training of health personnel should give emphasis to the proper use of antibiotics.**

5.4 IDENTIFYING MAIN DETERMINANTS TO ACCEPTANCE, USE AND COMPLIANCE TO ZINC IN THE TREATMENT OF DIARRHEA

Some factors affecting acceptance, use and the completion of treatment were explored. Notably, the price of medication, perception of the risk linked to the use of zinc, difficulties of its use in accordance with the prescription, perception of the zinc tablets and perception of its efficacy.

5.4.1 Price of ORS/zinc

During the intervention, a blister of 10 tablets for the children 6-59 months (or 5 tablets for the children of less than six months) was sold by health facilities for 100 FCFA and a sachet of ORS was sold separately at a price between 65 and 150 FCFA. The CBOs sold zinc together with 2 ORS sachets at a total price of 300 FCFA. These prices were considered cheap or affordable by 90% of mothers: "For zinc, the price is good, it is accessible"; "Affordable price." For a few, the price was "dear" or difficult to separate from other medicine purchases. All service providers also considered the price of zinc and ORS affordable or cheap. "Yes, they always buy the two". The rate of zinc purchase after prescription was 99.2%. The desire to see the child cured was the main motivating factor for the purchase.

CONCLUSIONS AND RECOMMENDATIONS

The zinc and ORS were considered affordable by a large majority of mothers and by all service providers. The price did not seem to be a limiting factor to the access of zinc and/or ORS. However, price could limit the access to treatment for a minority of children of the community. It would be desirable to set prices such that they are not higher than those used for the pilot phase. Thus, a **"diarrhea kit" should be made available to the population at the cost of 300 FCFA.**

5.4.2 Perception of the risks associated with administration of zinc

The perception of some risks linked to the administration of a drug can influence its acceptance and/or the respect of prescription (dose and duration). During home visits to the children given zinc, 5% of mothers on the first visit and 2% on the second visit, said that zinc provoked some problems in their children. The majority perceived no problems: "I didn't see a problem. On the contrary, I think that it is a good medication for children" declared one mother. Health staff did not record any complaints from parents or observe any side-effects themselves. "No problem. We already used more than 100 tablets."

Some of the symptoms noticed could be linked to the diarrhea itself such as vomiting, fatigue/dehydration, convulsions, fever. They were nearly all danger signs indicating it is necessary to seek care in the health facility.

CONCLUSIONS AND RECOMMENDATIONS

The majority of caretakers and health staff did not perceive any problems in the use of zinc for the treatment of diarrhea. The few problems indicated were danger signs for severe diarrhea (convulsions, fatigue/dehydration, fever, lack of appetite). For these, it is absolutely necessary to look for treatment at the health facility.

Mothers should be made aware of the danger signs of diarrhea and the need to seek immediate health care during sensitization meetings or consultations.

5.4.3 Preparation and administration of zinc and ORS to children

The zinc tablets are dispersible in a small quantity of water or milk (preferably breastmilk). It is also possible to administer directly into the mouth of older children. The tablet dissolves in water

and does not need to be crushed. This method of preparation and administration recommended was used in 94% of cases (Table 2).

The other methods of administration (dilution in complementary food, in a glass/cup or with other medication) present risks of loss if the child does not drink the whole quantity or if he/she refuses because of the taste.

Table N° 2: Method of zinc administration

Method of zinc administration	1 st round	2 nd round
	(n=122)	(n=115)
Tablet in a tablespoon + water	91%	92%
Tablet in a glass/cup of water	2.5%	0.8%
Tablet + breast milk	0.8%	2.6%
Tablet directly into the mouth	1.6%	0.8%
Tablet + Metronidazol syrup	1.6%	0.8%
Tablet in a tablespoon + ORs	0.8%	-
Tablet in the pap	0.8%	2.6%
Tablet diluted to make a purgative	0.8%	-

It is notable that 23% of the cases during the 1st visit and in 12.2% of the cases during the 2nd visit crushed the tablet before adding water. This could be explained by the lack of demonstration or explanation during consultation, but also due to the tradition of crushing tablets like paracetamol before giving it to children.

On the whole, the mothers know that 1 liter of water is necessary for a correct ORS preparation and that it must be used within 24 hours. However for some, measuring the correct quantity of water poses a problem. Difficulties linked to the administration of zinc or ORS to children cited were the refusal by the child and vomiting.

CONCLUSIONS AND RECOMMENDATIONS

Zinc was prepared and administered correctly by the majority of mothers (95%). However, it should be noted that there was the unnecessary practice of crushing the zinc tablet. One woman indicated a preference for syrup for a child 0-6 months.

The following recommendations are made:

- **Demonstrate the preparation and the administration of zinc and ORS to the mother while preparing the first ORS sachet with her and while administering the first zinc tablet. Educational messages must also explain the process and emphasize the tablets are soluble.**
- **Give clear instructions to the mothers for the management of vomiting (for example, by giving in small quantities) and promote the active administration of ORS or zinc.**

5.4.4 Factors that can limited access to zinc

Among persons that knew of zinc but did not use it to treat diarrhea in their children various reasons were cited (Table 3).

Table N°3: Reasons for the non-administration of zinc during the last diarrhea episode

Factors limiting zinc access in the treatment of diarrhea	Number of cases (n=9)
Lack of financial means	1/9
Stock Out	1/9
No prescription	5/9
Diarrhea not serious	1/9
Forgot	1/9

The table suggests that the lack of prescription by the service providers limited the access/use of zinc by some children. The stock-out and the lack of financial means appeared as other limiting factors.

Some of these factors had also been indicated during the monitoring/supervision or exit interviews. Moreover, certain health personnel prescribed ORS for the treatment of diarrhea without also prescribing zinc, although it was available in the health facility.

CONCLUSIONS AND RECOMMENDATIONS

The stock-out and the non-prescription of zinc by the health staff for the treatment of diarrhea are important factors that can limit the access of children to this treatment. This suggests the following recommendations:

- **Make available the "diarrhea treatment kit" in order to avoid the prescription of one without the other;**
- **Put in place a system for regular replenishment of supplies for each distribution network.**

5.4.5 Determinants of completion to treatment during 10 days

A semi-quantitative survey of behavioral barriers using the "Doers/Non-doer" method was used to explore factors influencing adherence to the 10-day treatment. Thus "doers" gave the child a 10-day treatment while "non-doers" gave the child less than 10 days of treatment.

CONCLUSIONS AND RECOMMENDATIONS

Three main barriers to following the 10-day treatment were identified:

- The level of knowledge on the advantages of the 10-day dose.
- The perception that treatment duration is long and the observed rapid recovery of the child. Thus "non-doers" did not think it useful to continue treatment once the child appeared to be cured. They could not observe the protective benefits of continued treatment.
- The self-efficacy of the mother. The doers were more motivated than the non-doers in giving the treatment. Table 4 proposes the strategies to reduce barriers and improve completion to treatment.

Table N° 4: Strategies for improving observance to treatment

Determinants/Barriers	Strategies to reduce barriers and improve compliance
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Level of knowledge of the advantages of prevention and treatment	Promotion of preventive and curative advantages of zinc supplementation during diarrhea through various channels: health personnel, community relays, radio, television, testimony, posters, brochure.
Duration of treatment considered too long	Educational messages on the preventive benefits of 10 days of zinc supplementation for the child and the mother. Promotion of strategies to reduce refusal by children. Promotion of ways to recall the duration of treatment. Promotion of the factors that facilitate zinc administration.
Motivation of the mother	Increase the motivation of the mothers to give zinc during 10 days while promoting the benefits for the mother herself.

5.4.6 Perception of zinc tablets

Mothers were interviewed on their perceptions of the taste, size and other properties of the zinc.

CONCLUSIONS AND RECOMMENDATIONS

Very few parents had an opinion on the taste, appearance or the size of the zinc tablet. One person found the tablet "big:"

"I didn't taste", "I don't know"

"It is a good tablet, easy to dissolve."

Some mothers found that the zinc tablets could be mistaken for other tablets: "It is possible to confuse it with quinine 300"; "These tablets resemble paracetamol". But the others thought that confusion is not possible: "No, the packaging is different".

To most of the health staff, it would be difficult to confuse it with other tablets because it is the only one that dissolves easily.

5.4.7 Perceptions of efficacy

Service providers and caretakers were interviewed for their perception of the efficacy of zinc.

CONCLUSIONS AND RECOMMENDATIONS

Both parents and service providers found zinc to be an effective treatment for diarrhea.

All mothers found that zinc contributes to the treatment of diarrhea in children: "It treats;" "It cures;" "Its action is fast;" "It's already two months that she drank; she is doing very well and she is not very sick as before."

Mothers cited the curative effect of zinc and its easy administration as advantages; they did not cite any preventive advantages. The complementary roles of zinc and ORS in the management of diarrhea and the need for both are not well understood by the parents.

Service providers also found it to be an effective treatment: "Since we started giving it to the children, the results are positive"; "The results are good. The action is fast: at the end of 2 days the diarrhea stops".

Zinc is not regarded as a replacement treatment for the others.

The role of every medication in the management of diarrhea must be reinforced at the level of the community.

5.5 IDENTIFYING THE MOST SUITABLE MEANS TO DISSEMINATE MESSAGES ON THE USE OF ZINC IN THE TREATMENT AND PREVENTION OF DIARRHOEA

In the intervention, many parties were trained, notably health staff, radio broadcasters, village health committee members and CBO members. In addition, a radio spot was produced for broadcast in the three community radio stations that operated in the zone (Radio Zenith, Radio Marveille and Radio Aurore).

According to the end line survey, 36% of mothers (n=69) had heard of zinc, while it was virtually unknown before the intervention (only one person had heard of it, through a pharmacy poster). The information was received through several sources: health staff constituted the main source of information (55%), followed by the radio (23%).

1.1.1.1.1.2 Table N° 5: Sources of information on zinc

Sources of information on zinc	% citing
Health personnel	55
Radio	23
A neighbor/friend	20
Community agents (CBO or health committee members)	14
Television	4
Another parent	7
Ambulatory seller	6

CONCLUSIONS AND RECOMMENDATIONS

The main sources for messages on zinc were the health staff, the radio and the formal or informal community agents.

Before the scaling up, it is important to train the health staff as well as the community agents. Their messages should be reinforced by those of the mass media in the framework of a communication plan.

5.6 DEVELOP, TEST AND REPRODUCE EDUCATIONAL MATERIALS FOR THE PROMOTION OF THE COMBINED USE OF ORS + ZINC IN THE TREATMENT OF DIARRHEA

During this period, the project produced only a poster for service providers, presenting the four rules for the management of diarrhea. However, data collected should help inform the production of additional educational materials.

CONCLUSIONS AND RECOMMENDATIONS

The information collected from both quantitative and the qualitative sources suggest materials must:

- Address the determinants of compliance with 10-14 day treatment with zinc;

- Specify the appropriate use of every "medication" in the treatment of diarrhea;
- Review the four rules of managing diarrhea;
- Highlight the types of diarrhea requiring an antibiotic therapy.

VI- GENERAL CONCLUSION AND RECOMMENDATIONS

As a result of project advocacy zinc is now included on the list of essential drugs in Cameroon, but it is not yet available through the official drug procurement channel.

During scale-up of its promotion, it will be useful to make a "diarrhea treatment kit" composed of ORS and zinc available to the population through CBOs and health facilities while addressing the shortcomings of staff in both networks through training and communication. It will be important to involve pharmacy operators as well, as more than 10% of mothers go there for diarrhea treatment.

Zinc was prepared and administered correctly by large majority of the mothers sampled in our study (95%). However, a minority unnecessarily crushing the zinc tablet before trying to dissolve.

Both parents and service providers found zinc to be a good treatment for diarrhea. It was not perceived to be a replacement of treatment with ORS.

The majority of the mothers and all the service providers in our sample did not perceive any difficulties in using zinc to treat diarrhea. The few problems cited were rather danger signs of diarrhea (fatigue/dehydration, convulsions, fever, lack of appetite).

Stock-outs and the non-prescription of zinc by the health staff for the treatment of diarrhea are the main factors limiting the access of children to this treatment. The price of zinc and of the combination ORS/zinc was considered cheap or affordable by mothers and service providers.

The compliance with the 10-day treatment with zinc is of an acceptable level as compared to values obtained elsewhere, but could be improved. We suggest that promoting the 14-day treatment may increase observance of at least 10 days of treatment; however, it will be necessary test this hypothesis with further research after the scale-up of treatment.

Three main barriers to completion of the 10-day course were identified: the level of knowledge regarding the preventive advantages of zinc; the perception that the duration of treatment is too long; and the self-efficacy of the mother with respect to the treatment.

The introduction of zinc led to an increase in the use of ORS/ORT but, did not reduce the incorrect use of antibiotics. These antibiotics are mainly prescribed (incorrectly) by the health staff. The use of anti-diarrheal drugs is rather rare.

The main interpersonal sources of information about zinc were health staff and formal or informal community agents. Their messages must be reinforced by the mass media within the framework of a coordinated communications plan.

GENERAL RECOMMENDATIONS

- A) To the MOH: accelerate the import procedures to assure adequate supplies of zinc.
- B) To the other partners (UNICEF, ACMS, HKI, Plan Cameroon etc.) : provide technical and financial support to MOH for a successful introduction of zinc in the treatment of diarrhea in Cameroon