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## Strengthening the pneumonia response in Chad: Formative assessment 2022

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Established in 2003, Malaria Consortium is one of the world's leading non-profit organisations specialising in the prevention, control and treatment of malaria and other communicable diseases among vulnerable populations. Our mission is to save lives and improve health in Africa and Asia through evidence-based programmes that combat targeted diseases and promote universal health coverage.

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## Abbreviations

AAH	Action Against Hunger
ALIMA	Alliance for International Medical Action
CSSI	Centre de Support en Santé Internationale
DHIS2	District Health Information Software
EPI	Expanded Programme on Immunization
FGD	focus group discussion
HW	health worker
IDI	in-depth interview
IEC	information, education, communication
IMCI	Integrated Management of Childhood Illness
ARI	acute respiratory infection
MICS	Multiple Indicator Cluster Survey
MSF	Médecins Sans Frontières
MPHNS	Ministry of Public Health and National Solidarity
NGO	non-governmental organisation
UHC	universal health care
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WASH	water, sanitation and hygiene
WHO	World Health Organization

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## Abstract

**Introduction:** In Chad, pneumonia has a high mortality rate (23.7 percent) among children under five. The country is the eighth most affected by this disease in the world. According to the 2015 Demographic Health Survey, only 26 percent of children under five suspected of having pneumonia were taken to a health facility. Of these, only 30 percent received antibiotics. This situation worsened in 2019, with only 18 percent of children who presented with symptoms of pneumonia receiving antibiotics.

To address this disease, a harmonised and coordinated response from the Ministry of Public Health and National Solidarity, in collaboration with its various partners, is more necessary than ever. Malaria Consortium, in partnership with the Ministry of Public Health and National Solidarity, has initiated a project to develop a pneumonia control strategy that will build on current methods and systems used at different levels of the health system to improve pneumonia management.

**Objective:** To assess the gaps in prevention, diagnosis, treatment and referral of pneumonia cases and identify potential opportunities to improve pneumonia management.

**Method:** A mixed-method approach was taken. The quantitative component focused on routine data on pneumonia indicators at the national level, while qualitative data were collected through in-depth interviews and focus group discussions to gather the views of stakeholders on pneumonia case management in Chad.

**Result:** This formative assessment revealed that there are programmes to address childhood diseases, such as the Integrated Management of Childhood Illness, but its implementation at the community level is not effective due to a lack of funding, quality health service delivery and monitoring of activities. Other points raised were the weaknesses of the child health service offer, the insufficient number and quality of health workers, inadequately equipped technical facilities and poor capacity development for healthcare providers. In relation to pneumonia, the challenges are the absence of a vaccine, insufficient diagnostic tools, lack of awareness of the danger signs, insufficient supply and availability of amoxicillin and oxygen, and indoor air pollution in households.

**Conclusion:** In general, newborn and child health presents challenges in terms of funding, human resources, capacity development and service delivery — especially at the community level. However, the prioritisation of child health, including pneumonia, by the Ministry of Public Health and National Solidarity and its partners, as well as the existence of IMCI, are assets that could be built upon to improve child health.

# 1 Introduction

Pneumonia is the leading infectious cause of death in children under five worldwide. According to the Global Burden of Disease estimates, 672,000 children under five died of pneumonia in 2019, which is equivalent to almost two deaths every minute.<sup>[1]</sup>

In Chad, pneumonia has a high mortality rate (23.7 percent) among children under five.<sup>[1]</sup> The country is the eighth most affected by pneumonia in the world. According to the 2015 Demographic Health Survey, only 26 percent of children under five who were suspected of having pneumonia were taken to a health facility. Of these, only 30 percent received antibiotics.<sup>[2]</sup> This situation worsened in 2019 with only 18 percent of children with pneumonia symptoms receiving antibiotics (see Appendix 1).<sup>[3]</sup> The measles epidemic in Chad is exacerbating the health outcomes for children under five. Chad has a national health strategy for community-based care that includes integrated case management. However, due to the lack of sustained support for community health development, this strategy is lagging.

To address pneumonia, a harmonised and coordinated response from the Ministry of Public Health and National Solidarity (MPHNS — otherwise known as *Le Ministère de la Santé Publique et de la Solidarité Nationale*), in collaboration with its various partners, is more necessary than ever. Malaria Consortium, in partnership with the MPHNS, has initiated a project to develop a pneumonia control strategy that will build on the current methods and systems used at different levels of the health system to manage pneumonia. Officially launched on 17 June 2022 under the patronage of the Minister of the MPHNS, the project aims to improve the prevention, diagnosis, treatment and referral of children with pneumonia in Chad. The activities of this project started with an inclusive consultation with the MPHNS resource persons and stakeholders through individual interviews and focus group discussions (FGDs) to collect their opinions on the management of pneumonia cases in Chad. The results of these interviews and subsequent thematic analysis will be used to define priorities for the development of the pneumonia control strategy.

## 2 Literature review

Pneumonia is the number one infectious disease killer of children worldwide, claiming over 700,000 lives under the age of five each year — more than 2,000 a day.<sup>[4]</sup> According to the United Nations Children's Fund (UNICEF), there are growing health inequalities that disproportionately affect the poorest and most marginalised children in low- and middle-income countries. Pneumonia is still the major forgotten disease in global and national health programmes.<sup>[4]</sup> In most developing countries, it is accompanied by high case fatality rates. Of the five million deaths each year in children under five, 20 percent are attributable to acute respiratory infections (ARI), with 14 percent of children under five being killed by pneumonia.<sup>[5]</sup>

### 2.1 Universal health coverage

Chad adopted the National Strategy for Universal Health Coverage on 3<sup>rd</sup> September 2015.<sup>[6]</sup> In addition, Chad also developed the National Social Protection Strategy in 2015.<sup>[7]</sup> Together, these two strategies aim to contribute to improving the wellbeing of the Chadian population. In addition, the law on universal health coverage (UHC) was adopted in June 2019 by the National Assembly. Through these strategies, the government aims to improve the living conditions of the population by



facilitating access to a minimum of quality healthcare for all. The government aims to provide quality care, reduce out-of-pocket payments for healthcare and protect the population from the risk of falling into poverty.

As part of this formative assessment, a situational analysis was carried out using Malaria Consortium's Universal Health Coverage tool (not included as part of this publication).

## 2.2 The Integrated Management of Childhood Illness strategy

With the aim of reducing the large number of children who die before their fifth birthday, especially in developing countries, the World Health Organization (WHO) and UNICEF took the initiative in the early 1990s to develop an Integrated Management of Childhood Illness (IMCI) strategy. This strategy, which covers the most common diseases in children, has three main components<sup>[8]</sup>:

- Integrating care for sick children in institutions and health centres
- Strengthening health systems, including drug supply and logistical support
- Community IMCI or promotion of key family and community behaviours.

In Chad, the IMCI strategy has been implemented since 2005 with the development of a protocol for the management of the most recurrent childhood illnesses. It consists of evaluating, classifying and identifying the correct treatment for a case of illness. It is an ambitious strategy because it not only involves training health workers (HWs) to offer quality care to sick children, but also educating mothers to be autonomous in the diagnosis of certain cases of illness through clinical signs, management at community level and early case referral.<sup>[9]</sup>

The second component of IMCI in Chad faces many difficulties that hinder its effective implementation throughout the country. The 2019 *Annuaire des Statistiques Sanitaires* (Health Statistics Yearbook) showed that the number of healthcare providers per capita in Chad is below the normal threshold.<sup>[10]</sup> In addition, there is a poor distribution of providers throughout the country. The country's cold chain situation is also challenging. Only three provinces recorded a cold chain coverage rate of 100 percent.<sup>[10]</sup> Added to this is the lack of regular capacity development of HWs on the IMCI protocol.<sup>[10]</sup>

## 2.3 The most common childhood disease in Chad

Malaria, pneumonia, malnutrition and diarrhoeal diseases are the main causes of health consultations among children under five at health centres in Chad. In 2019, hospitals reported 1,204,911 new cases, of which malaria and ARIs alone accounted for more than 50 percent of all morbidities recorded in this age group.<sup>[8]</sup>

The 2021 *Enquête Nationale de Nutrition et de Mortalité Retrospective SMART* (National Retrospective SMART Survey of Nutrition and Mortality) indicated that the prevalence of ARIs at national level was 29.4 percent.<sup>[11]</sup> ARIs are unevenly distributed by province, with some provinces recording a prevalence that was significantly higher than the national average. These provinces included Logone Occidental (66.4 percent), Logone Oriental (57.9 percent), Salamat (40.3 percent), Moyen-Chari (39.5 percent), Mandoul (34.5 percent), Mayo-Kebbi Est (32.7 percent) and Mayo-

Kebbi Ouest (30 percent).<sup>[11]</sup> A table summarising the prevalence of ARIs by province can be found in Appendix 2.

## 2.4 Mortality in children under five years of age

The results of the 2019 *L'Enquête par Grappes à Indicateurs Multiples* (Multiple Indicator Cluster Survey [MICS]) revealed that Chad recorded 122 deaths in children under five per 1,000 live births.<sup>[3]</sup> This national average is largely driven by the rural population. The survey reported 128 deaths in children under five per 1,000 live births in rural areas, compared to 94 deaths per 1,000 live births in urban areas. It should also be noted that the probability of a child dying before their first birthday remains high. Infant mortality is estimated at an average of 79 deaths per 1,000 live births.<sup>[3]</sup> Table 1 below summarises information on mortality in children under five by type of settlement. See Appendix 3 for a breakdown of mortality by province.

Table 1: Mortality in children under five by place of residence

	<b>Neonatal mortality*</b> (Probability of dying in the first month of life)	<b>Infant mortality*</b> (Probability of dying between birth and first birthday)	<b>Child mortality*</b> (Probability of dying between the first and fifth birthday)	<b>Under-five mortality*</b> (Probability of dying between birth and fifth birthday)
<b>National average</b>	<b>33</b>	<b>79</b>	<b>47</b>	<b>122</b>
<b>Urban</b>	32	63	32	94
<b>Rural</b>	34	82	50	128

\*per 1,000 live births

Source: MICS 2019<sup>[3]</sup>

## 2.5 Risk factors for pneumonia

### 2.5.1 Vaccination coverage by antigen

In Chad, antigens are available for children under five for a range of childhood diseases including measles, hepatitis B, diphtheria, pertussis, haemophilus influenzae and tetanus through the Penta1 vaccine (see Table 2). Complete vaccination coverage before the first birthday is not achieved for any antigen, and full immunisation coverage is at 43.1 percent according to the 2019 MICS.<sup>[3]</sup> It should be noted that Chad has not yet introduced the pneumococcal conjugate vaccine (PVC) against pneumonia as part of its routine Expanded Programme on Immunization (EPI).<sup>[12]</sup>

Table 2: Vaccination coverage by antigen

Type of vaccine	Vaccination coverage at national level (%)	Data source
<b>Tuberculosis</b>	60	WHO/UNICEF estimates of national immunization coverage (WUENIC) 2020 <sup>[13]</sup>
<b>Poliomyelitis</b>	52	WUENIC 2020

<b>Poliomyelitis</b>	51	WUENIC 2020
<b>Hepatitis B, diphtheria, pertussis, haemophilus influenzae and tetanus (Penta1)</b>	69	WUENIC 2020
<b>Hepatitis B, diphtheria, pertussis, haemophilus influenzae and tetanus (Penta3)</b>	52	WUENIC 2020
<b>Pneumococcal vaccine</b>	Not available in the routine EPI*	
<b>Rotavirus vaccine</b>	Not available in the routine EPI*	
<b>Rubella vaccine</b>	57.3	MICS 2019 <sup>[3]</sup>
<b>Yellow fever vaccine</b>	35	WUENIC 2020
<b>Measles vaccine</b>	75	WUENIC 2020
<b>Meningitis vaccine</b>	39.3	MICS 2019
<b>Full immunisation coverage</b>	43.1	MICS 2019

\*EPI = Expanded Programme on Immunization

## 2.5.2 Nutritional status of children under five

The nutritional situation in Chad is poor. At the national level, the results of the 2021 National Retrospective SMART Survey of Nutrition and Mortality revealed a high prevalence of global acute malnutrition (10.9 percent), with two percent of children suffering from severe acute malnutrition.<sup>[11]</sup> At the provincial level, there is a large disparity with seven provinces recording very high or critical prevalence ( $\geq 15$  percent) according to the WHO classification. In addition, just under a third of children under five suffer from stunting, with about 12 percent suffering from the severe form.<sup>[11]</sup> In relation to exclusive breastfeeding, around just one in nine children (11.4 percent) are exclusively breastfed for the first six months after birth. The prevalence of anaemia at national level among children 6–59 months is estimated at 60.3 percent.<sup>[11]</sup> At the subnational level, 16 out of 23 provinces have a global acute malnutrition rate of  $\geq 10$  percent, which, according to the WHO classification, is classed as worrying in the 2021 National Retrospective SMART Survey of Nutrition and Mortality.<sup>[11]</sup> The prevalence of acute and chronic malnutrition by province is presented in Appendix 4.

## 2.5.3 Indoor air pollution

According to WHO, exposure to indoor air pollution is responsible for 44 percent of pneumonia deaths among children under five.<sup>[14]</sup> Results from the 2019 MICS show that Chadians rely mainly on the 'fire on three stones' energy source (otherwise referred to as an open fire), which can be harmful when managed in an enclosed space and where there is exposure to high levels of smoke. More than nine out of 10 people depend on this energy source. This proportion is also unevenly distributed according to the area of residence. In rural areas 98 percent of people use this energy source, compared to 63 percent in urban areas.<sup>[3]</sup> The table below shows the proportion of individuals dependent on each energy source, grouped by area of residence.

Table 3: Source of cooking energy by area of residence

Type of cooking energy source	Urban (%)	Rural (%)	National (%)
Electric cooker	0.6	0	0.1
Solar cooker	0	0	0
Liquid gas cooker	3.0	0	0.6
Natural gas cooker	22.7	0.1	4.4
Biogas cooker	4.4	0	0.9
Liquid fuel cooker no alcohol/ethanol	0	0	0
Solid fuel cooker	1.0	0	0.3
Traditional solid fuel cooker	2.9	0.9	1.3
Fire on three stones/open fire	63.0	98.0	91.3
Other cooker	1.6	0.4	0.6
No cooked food in the household	0.7	0.4	0.5
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: MICS 2019<sup>[3]</sup>

### 2.5.4 Water, sanitation and hygiene

Access to quality drinking water, sanitation and hygiene (WASH) is important for child health. Poor hygiene puts children at risk of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio. According to the 2019 MICS, 38.2 percent of people use unimproved water sources.<sup>[9]</sup> The same survey also revealed that more than three out of four households have a very high risk of faecal contamination according to the level of *Escherichia coli* detected in the household drinking water. Compared to urban areas (61.7 percent), rural areas are more affected by this phenomenon (81.7 percent). In addition, at the national level, 65.6 percent of households defecate in the open air.<sup>[9]</sup>

## 3 Objective

### 3.1 General objective

To assess the gaps in prevention, diagnosis, treatment and referral of pneumonia cases and generate evidence that will support the development of the pneumonia control strategy.

### 3.2 Specific objectives

1. To assess challenges facing Chad in the prevention, diagnosis, treatment and referral of pneumonia cases
2. To collate information on specific indicators that can be used to inform the pneumonia control strategy
3. To assess existing opportunities that can be leveraged to improve pneumonia case management
4. To assess the contribution of stakeholders for improving pneumonia case management.

## 4 Formative assessment design

### 4.1 Type of approach

This formative assessment used a mixed approach involving qualitative and quantitative methods. The quantitative component consisted of a desk review collecting routine data on pneumonia indicators at the national level through the relevant documents. For the qualitative aspect of the formative assessment, in-depth interviews (IDIs) and FGDs were conducted with key stakeholders to gather opinions and views on pneumonia case management in Chad, including prevention, diagnosis, treatment and referral.

### 4.2 Participants

The participants in this formative assessment included staff of the MPHNS, United Nations agencies, non-governmental organisations (NGOs), HWs and community workers at central and peripheral levels. Participants were selected based on their availability, knowledge of pneumonia and their ability and willingness to participate in the activity. Table 4 below summarises the number of participants with their respective organisations that took part in the IDIs.

Table 4: List of participants in the individual interview

Organisations*	Services/departments	Numbers of Participants
MPHNS	Sexual and Reproductive Health Directorate	1
MPHNS	Community Health Directorate	1
MPHNS	DSIS Directorate	1
MPHNS	IMCI	1
MPHNS	Health Delegation	1
MPHNS	Mandelia Chief District Medical Officer	1
MPHNS	Hopital de L'union manager	1
MPHNS	Centre de Santé Ordre de Malte manager	1
MPHNS	Planning Department	1
MPHNS	National Direction of Food Technology	1
UNICEF	Health Programme	1
WHO	Child Health Programme	1
National Association of Paediatricians	National Association of Paediatricians	2
CSSI	Health and Nutrition Department	1
ALIMA	Health and Nutrition Department	1
First emergency	Health and Nutrition Department	1
MSF	Health and Nutrition Department	1
World Vision	Health and Nutrition Department	1
AAH	Health and Nutrition Department	1
<b>Total</b>		<b>20</b>

\*MPHNS=Ministry of Public Health and National Solidarity, UNICEF=United Nations Children's Fund, WHO=World Health Organization, CSSI= Centre de Support en Santé Internationale, ALIMA=Alliance for International Medical Action, MSF=Médecins Sans Frontières, AAH=Action Against Hunger

### **4.3 Data collection**

Data were collected from 1<sup>st</sup> to 31<sup>st</sup> August. The desk review was first carried out to assess the situation of pneumonia in Chad through official documents.

IDIs and FGDs were conducted with stakeholders to capture their views on child health, with a particular focus on pneumonia. A semi-structured IDI guide was used to facilitate the interviews with the participants. The interviews were held in a suitable location that was selected in mutual agreement with the participants. The interviews lasted between 35 and 60 minutes. The interviews were conducted and transcribed in French and translated into English. During the interview process, the interviewer was assisted by a note taker and the discussion was recorded on a digital voice recorder with the verbal consent of the participant. A total of 20 IDIs were conducted (12 with MPHNS staff and eight with NGOs working in the field of child health). Two FGDs with 16 participants (eight per focus group) were organised, one with HWs in health facilities and the other with community workers in the Mandelia health district. The information collected was stored securely while guaranteeing the anonymity of the participants.

### **4.4 Informed consent**

The interviews were conducted in a quiet and comfortable place. The data collector gave the participant sufficient time to review the information provided or to be verbally informed of the consent process to ensure that they fully understood the purpose of this activity and that they had the right to withdraw at any time. Each participant gave verbal consent prior to the interview and recording.

### **4.5 Compensation**

No refunds or compensation (financial or otherwise) were offered to participants or potential individuals in connection with their participation in this activity.

### **4.6 Privacy and confidentiality**

The anonymisation of all participants in this activity was done by assigning them an identifier. The data collected were protected by clearly defining the access rights, the conditions of use and the way the results have been published. Digital data were transferred and stored in a password-protected format. The raw data collected and analysed will not be shared with anyone other than those responsible for this activity. Malaria Consortium will keep all records securely for five years after the end of the project, unless a longer period is recommended by local regulatory authorities or requested by the principal investigator, considering donor requirements.

## **5 Results**

### **5.1 Strengths and opportunities for newborn and child health services**

Most of the MPHNS participants cited the strengths of newborn and child health services in Chad as the prioritisation of maternal and child health by the MPHNS; the existence of health structures, notably health centres, district hospitals and referral hospitals; the existence of a child health

service; the existence of dynamic teams carrying out activities; and the action plan for each newborn. Additionally, the following opportunities were referenced: the existence of healthcare providers, some of whom have been trained in IMCI strategy with the help of a training module developed by the Child Health Department; and the contribution of financial and technical partners to support the activities.

“In terms of strengths, there is the existence of a child health service, there is the clinical and community IMCI strategy, the action plan for each newborn and there is the community IMCI training module.”

MPHNS staff, IDI

## 5.2 Weaknesses in newborn and child health services

While strengths and opportunities for newborn and child health were identified, participants also cited weaknesses that need to be addressed. Most participants pointed to the lack of funding available to support activities to improve newborn and child health. Although there are strategies such as IMCI, their implementation is still a challenge due to the lack of funding. Another point raised was the weakness of the health service offer. Participants described how the number of healthcare providers was insufficient and that health facilities were inadequately equipped, leading to a lack of follow-up on planned and implemented activities.

“As far as financial resources are concerned, the MPHNS has no means to support the service, so we turn to partners to ask for help. Concerning medical equipment, there is not enough material on the ground. The staff are trained but do not have the materials to do the work. Also, human resources need to be in quantity and quality.”

MPHNS staff, IDI

## 5.3 Challenges to Integrated Management of Childhood Illness strategy implementation

The IMCI strategy has been developed with the aim of improving the health of newborns and children. However, participants raised several challenges associated with the strategy. The main difficulties included: a countrywide lack of HW training on the IMCI strategy; insufficient funding; insufficient implementation of community and clinical IMCI; limited diagnostic equipment in health structures; and insufficient quantity and quality of human resources.

“There are no IMCI cards<sup>1</sup> in the field. There is a lack of material resources such as timers in the case of pneumonia. The telephone timers are used to count the number of breaths per second. There is a lack of human resources in quality and quantity. Those who are trained implement the strategy, but they are limited. The problem is the lack of cards in the health structures and at community level.”

MPHNS staff, IDI

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<sup>1</sup> IMCI cards are sheets containing information on the children in the IMCI programme.

“If staff are not well trained and equipped, they will not be able to provide 100 percent care. Except for the agents who know how to diagnose the problem and who are better equipped. Then, they can quickly perform the first gestures and refer the child to a centre with a technical platform to continue the treatment.”

HW, FGD

## 5.4 Key challenges to reducing child morbidity and mortality

In relation to healthcare service delivery, the following main challenges emerged from this formative assessment: insufficient quality of care offered; problems of availability and access to treatment; lack of inputs and consumables in health structures; poor distribution of human resources throughout the country; poor care at community and primary level; insufficient development of community health; cost and access challenges in relation to access to health facilities and care; insufficient community IMCI; insufficient funding; and insufficient technical equipment and diagnostic tools such as pulse oximeters, automatic frequency counters and timers.

“IMCI training was introduced in 2008 and is to be carried out throughout the country. Not everyone has received this training. In the field, we see all the children’s illnesses, but they are insufficiently taken care of. IMCI must consider all the observable parameters. In practice, nothing is done.”

HW, FGD

On the demand side of healthcare services, participants noted poverty and community misperceptions, as well as problems related to environmental factors such as indoor air pollution in households and WASH.

In addition to the above, several challenges were raised with regard to pneumonia at the community level. These challenges included: lack of knowledge on the warning signs of pneumonia; lack of essential tools for the diagnosis of pneumonia such as automatic respiratory rate counters, pulse oximeters, oxygen extractors and timers; lack of amoxicillin for the management of pneumonia in health centres; misuse of medicines; weak capacity building for HWs on the protocol for the management of pneumonia; lack of specific funding for pneumonia control activities; lack of awareness of the dangers of indoor air pollution; suboptimal immunisation coverage of routine EPI; lack of a pneumonia vaccine; and the precarious nutritional status of children.

## 5.5 Community mobilisation in the fight against pneumonia

The majority of HWs reported that they carry out sensitisation in the community, as well as information, education and communication (IEC) at the health centre. However, this concerns all childhood pathologies and there are no community mobilisation activities with a specific focus on pneumonia.

“Our role is to go out into the community to identify leaders to convince them to participate in awareness raising. They will go to other communities so that we can hold awareness meetings. We convince the community to visit the health centres in case of illness; for pneumonia, we sensitise mothers on how to protect their children.”

HW, FGD



“Speaking of pneumonia, during the peak periods, some people include it in educational talks and others do not. Unfortunately, pneumonia awareness is not effective.”

HW, FGD

Some MPHNS participants revealed that efforts had been expended to reduce the burden of disease and mortality in children under five by involving the community. This included engagement with religious leaders and traditional chiefs, as well as promoting the recruitment and training of community HWs in all localities.

Partners also reported using various strategies to mobilise and empower the community. For example, some organisations referred to the development of a referral system in health centres that uses local resources such as donkeys and carts. Others cited training mothers to diagnose malnutrition and make referrals themselves, as well as describing how community mobilisation has been achieved through meetings to exchange positive practices.

## 5.6 Health information system

According to an MPHNS participant, while there is a digitisation system in place, it is not operational at all levels. The participant described how the District Health Information Software, otherwise known as the DHIS2 system, is being installed in all the province in Chad. This system considers most diseases, including pneumonia. Information is fed into the system from the health centres through monthly activity reports on the data collected each month. The participant detailed how training on the DHIS2 system is provided to staff at the central level and to those in charge of the major hospitals. All district management teams have been trained. The next phases of training will concern the health centre managers. Some organisations reported using their own information system, which works independently of others.

“The system exists but is not yet operational at all levels. Most of the data for several diseases are collected from health facilities where the DHIS2 is operational. Data on pneumonia is also received.”

MPHNS staff, IDI

“We have our own system for digitising data; the ideal is to have all the same system. We have tried digitising malaria data using DHIS.”

Partner, IDI

## 5.7 Resource mobilisation for the Integrated Management of Childhood Illness strategy and pneumonia

According to the participants, the MPHNS does not allocate funds specifically for IMCI or pneumonia. If there are activities, the MPHNS mobilises the funds to carry out activities and partners are used. Previously, there were roadmaps that were used for child health activities.

“The Ministry of Health does not allocate specific funds to IMCI, but we make requests to different partners to implement activities. To improve this, a budget will have to be allocated to each directorate of the MPHNS for the implementation of activities.”

MPHNS staff, IDI

Concerning NGO partners, the participants stated that they do not allocate funds specifically to pneumonia, but when carrying out their activities, they consider the management of pneumonia cases. In the case of co-morbidities, if it is pneumonia, some NGOs described referring children to the appropriate facilities for treatment and incurring the treatment cost. Participants also described cases where NGOs indirectly supported the management of pneumonia cases by providing certain antibiotics to the health centre.

## 5.8 Medical equipment and diagnostic tools

Most healthcare providers indicated that diagnostic materials and tools are almost non-existent in health facilities. This was the case for pulse oximeters, oxygen extractors and automatic respiratory rate counters. In the facilities where these tools are available, participants described how they are often defective due to lack of maintenance. At community level, participants stated that these tools are not available. However, at the primary level, these tools are present in some health facilities.

“The tools that exist in our structures are stethoscopes. These tools have existed since the creation of the health centres and are in poor condition. The needs are expressed but we have not received the tools.”

HW, FGD

“The government does not have a lot of experience in providing oxygen and pulse oximeters. It does not provide this equipment; the materials do not exist at all levels. It is partners who provide some equipment and only accompany their areas of intervention. The areas that are not supported by the partners suffer. To improve this situation, the MPHNS must make this equipment available and strengthen health facilities at all levels in all provinces. We also want the partners to support the other areas. The children are not only the children of their areas of intervention. There needs to be coordination between partners to cover other areas.”

MPHNS staff, IDI

The partners were described as providing various equipment to the health facilities, such as pulse oximeters, oxygen and oxygen extractors. However, this was cited as insufficient, with limited reach and a lack of coordination. The partners also train HWs on the use of this equipment.

“Regarding the supply of oxygen, we had many requests from the ministry for the purchase of oxygen. We bought several cylinders during COVID-19 and outside COVID-19. We have purchased oxygen extractors and now we are training people to repair the oxygen extractors. We are assessing the country’s oxygen supply capacity. We have purchased an oxygen plant which will be installed in Mongo. We are in the process of repairing the oxygen unit at the Chad-China Friendship Hospital. We have big activities, we provide oxygen.”

NGO, IDI

## 5.9 Partnership

Participants described the Maternal, Neonatal, Infant, Adolescent and Youth Health platform that brings together financial and technical partners working in child health. They participate regularly in coordination meetings. Most NGO partners interviewed for this formative assessment cited that they are in the health and nutrition cluster.

“Indeed, partners are involved in the technical groups at all levels and regularly participate in the coordination meetings under the chairmanship of the Deputy Secretary General of the MPHNS.”

MPHNS staff, IDI

Some respondents said that the level of coordination is acceptable, but there are still some shortcomings. Others raised coordination as a concern and said the real problem of the partnership is the level of coordination for activities, as well as leadership and coordination at the MPHNS level. In addition, some partners pointed to the problem of mapping health actors, which prevents collaboration and communication with other health actors and can lead to coordination challenges.

## 5.10 Research, monitoring and evaluation

Participants were not aware of any studies that have been conducted to assess the quality of pneumonia case management. However, it was noted that the Alliance for International Medical Action (ALIMA) is conducting studies in other countries on pneumonia, the results of which can be applied to Chad.

With regard to monitoring and evaluation by the MPHNS, participants said that a dedicated monitoring and evaluation service had recently been established. This service is responsible for monitoring all the activities of the directorate, evaluating whether the programmed activities are carried out on time and determining whether the objectives are achieved. Participants also described bodies that are responsible for monitoring and evaluating partner activities.

“We have just integrated a service of planning, monitoring and evaluation for child health activities. It is a new department, but we asked for capacity building training for the agents. Before, each department did the monitoring and evaluation of its activities. To improve this, we asked for a data manager to manage our data.”

MPHNS staff, IDI

## 6 Discussion

This formative assessment has shown that newborn and child health is a priority for the MPHNS, which houses a dedicated directorate to deal with child disease. Within this directorate, qualified staff provide services to meet the challenge of child health. In addition, there is an IMCI strategy on the management of childhood illnesses. However, the community aspect of the strategy needs to be improved. Healthcare providers also exist, some of which have been trained in IMCI using the MPHNS training module. It is also important to note the presence of health structures throughout the country that provide health services. In addition, there are technical and financial partners who support the MPHNS in all its activities.

Although there are strengths associated with the newborn and child health approach in Chad, there are many bottlenecks that prevent the current system from providing quality care. The current implementation of the IMCI strategy is not effective, especially at the community level. This is due to a lack of funding, weak health service delivery, insufficient human resources in relation to quality and quantity, poorly equipped health facilities, poor capacity development for HWs and a lack of monitoring of activities. Regarding pneumonia, this formative assessment revealed a range of challenges, including the absence of a pneumococcal conjugate vaccine; a lack and insufficient use of diagnostic equipment (such as pulse oximeters, oxygen concentrators and automatic respiratory rate counters) at the community and primary care level; a lack of awareness of the danger signs in children; inadequate supply and availability of medicines and oxygen; poor maintenance of equipment; and the presence of indoor air pollution in households.

The shortage of human resources revealed in this formative assessment is consistent with the administrative data of the 2019 Health Statistics Yearbook. Despite the efforts made by the government with the support of its partners, the number of HWs is below the WHO standard (4.45 per 1,000 inhabitants) at 0.63 per 1,000 inhabitants.<sup>[10]</sup>

The budget allocated to finance health services in Chad represented 6.85 percent of the total state budget in 2019, according to the Health Statistics Yearbook.<sup>[10]</sup> However, at the Pan-African Heads of State Conference held in Abuja in 2001, it was recommended that African countries allocate at least 15 percent of their annual budget to health services to reach the health-related millennium development goals (goals three, four and five), which Chad approved.<sup>[10]</sup>

The results of this formative assessment are similar to the analysis of health services in Chad described in the *Plan National de Développement Sanitaire 2017–2021* (National Health Development Plan 2017–2021). The plan shows that the quality of services in general, and of mother and child services in particular, is insufficient due to poor accessibility (distance and financial) and use of health services.<sup>[15]</sup> The rate of use of curative care in first-level health facilities was 26 percent in 2014. There is a lack of operational capacity in the health services, low availability of essential medicines and inputs, a lack of qualified health staff and a problem maintaining the medico-technical equipment made available to health facilities.<sup>[15]</sup>

This formative assessment reveals other challenges, such as environmental factors (indoor air pollution and WASH) and community practices that hinder automatic care seeking in health facilities. Non-automatic care seeking has been shown by some studies. Indeed, the coverage rate of essential health services was just 28 percent in 2017, and only 26 percent of children with pneumonia

symptoms were taken to a healthcare provider in 2018.<sup>[3]</sup> Regarding access to safe water services, only 39 percent had access in 2017 and 67 percent of the population were found to defecate in open air. The 2019 MICS also found that the main source of energy for cooking used by households was firewood. This is a significant factor in indoor air pollution in households.<sup>[3]</sup>

## 7 Conclusion

In general, newborn and child health presents challenges in terms of financing, human resources (quality and quantity), capacity development for HWs, and service delivery — especially at the community level. This formative assessment has shown that the implementation of the community IMCI strategy is still lagging.

Regarding pneumonia, the challenges include the absence of a pneumococcal vaccine, the inadequacy of diagnostic tools, lack of awareness of the warning sign of pneumonia, inadequate supply and availability of medicines and oxygen, poor maintenance of equipment and the presence of indoor air pollution in households. In addition, the precarious nutritional situation of children and inadequate hygiene and sanitation conditions pose a challenge. As such, the prioritisation of child health by the MPHNS and its technical and financial partners, as well as the utilisation of the IMCI, could be used to improve child health in Chad.

## 8 Recommendations

As a result of this study, we make the following recommendations:

### **To the Ministry of Public Health and National Solidarity**

- Provide financial support for newborn and child health services
- Introduce a pneumonia vaccine into routine EPI
- Support the implementation of community and clinical IMCI
- Recruit and train HWs and promote health services
- Strengthen monitoring and evaluation activities at all levels
- Regularly develop the capacity of healthcare workers on IMCI and pneumonia case management
- Provide health facilities with equipment for the diagnosis and management of pneumonia
- Make IMCI cards available in health facilities and at community level
- Strengthen access to care for children in remote areas
- Make antibiotics and consumables available in health facilities
- Promote community and primary care management of pneumonia
- Develop community health policies
- Improve WASH conditions
- Improve immunisation indicators through comprehensive immunisation
- Make the DHIS2 available throughout the country and at all levels of the health pyramid
- Train HWs on the use of the DHIS2 platform
- Coordinate partners' activities to cover the whole country

- Conduct research to improve pneumonia case management
- Lead coordination and guidance with technical and financial partners.

**To health workers**

- Improve the quality of care provided
- Raise awareness among communities, educating and informing them about the importance of using health services
- Brief the community on the signs and symptoms of pneumonia and what to do if they are observed
- Strengthen community engagement
- Follow the IMCI protocol.

**To technical and financial partners**

- Continue to support the MPHNS in its mission
- Coordinate efforts and activities to cover all health facilities in the country.

## 9 Appendix

### Appendix 1

Appendix 1: Care seeking and antibiotic treatment of symptoms of acute respiratory infection (ARI) in Chad

	Percentage of children with ARI who received antibiotics (%)	Number of children with ARI symptoms	Percentage of children with ARI symptoms for whom the source of antibiotics was health facilities or providers (%)				
			Public	Private	Community health worker	Other source	Health facility or healthcare provider
<b>Total</b>	18.0	1,811	51.1	13.5	14.5	39.4	64.3
<b>Sex</b>							
<b>Male</b>	18.0	950	53.6	12.4	12.8	38.5	65.4
<b>Female</b>	18.1	861	48.3	14.7	16.4	40.4	63.0
<b>Residence</b>							
<b>Urban</b>	25.0	218	48.7	21.0	11.7	36.9	69.7
<b>Rural</b>	17.1	1,594	51.6	12.0	15.1	39.9	63.2
<b>Province</b>							
<b>Barh El Gazal</b>	9.8	32	(*)	(*)	(*)	(*)	(*)
<b>Batha</b>	4.5	122	(*)	(*)	(*)	(*)	(*)
<b>Borkou and Tibesti</b>	4.0	7	(*)	(*)	(*)	(*)	(*)
<b>Chari-Baguirmi</b>	13.4	59	(*)	(*)	(*)	(*)	(*)
<b>Ennedi-Est</b>	14.0	4	(*)	(*)	(*)	(*)	(*)
<b>Ennedi-Ouest</b>	16.0	5	(*)	(*)	(*)	(*)	(*)
<b>Guera</b>	11.9	126	(*)	(*)	(*)	(*)	(*)
<b>Hadjer-Lamis</b>	13.8	156	(*)	(*)	(*)	(*)	(*)
<b>Kanem</b>	14.5	70	(*)	(*)	(*)	(*)	(*)
<b>Lac</b>	8.4	110	(*)	(*)	(*)	(*)	(*)
<b>Logone Occidental</b>	22.3	138	(*)	(*)	(*)	(*)	(*)
<b>Logone Oriental</b>	(17.7)	80	(*)	(*)	(*)	(*)	(*)
<b>Mandoul</b>	36.0	107	(37.3)	(3.0)	(10.1)	(59.7)	(40.3)

Mayo-Kebbi Est	34.4	139	(*)	(*)	(*)	(*)	(*)
Mayo-Kebbi Ouest	37.7	100	(43.4)	(30.5)	(39.9)	(39.3)	(73.8)
Moyen-Chari	18.6	82	(*)	(*)	(*)	(*)	(*)
N'Djamena	(*)	21	(*)	(*)	(*)	(*)	(*)
Ouaddaï	12.2	104	(*)	(*)	(*)	(*)	(*)
Salamat	14.5	52	(*)	(*)	(*)	(*)	(*)
Sila	15.4	88	(*)	(*)	(*)	(*)	(*)
Tandjile	5.4	105	(*)	(*)	(*)	(*)	(*)
Wadi Fira	17.8	107	(*)	(*)	(*)	(*)	(*)
<b>Age (in months)</b>							
0–11	14.1	388	52.3	12.7	8.0	35.1	64.9
12–23	17.0	328	(58.5)	(17.7)	(22.0)	(36.5)	(76.1)
24–35	21.1	392	44.5	14.2	10.2	41.3	58.7
36–47	19.5	364	46.1	16.6	19.2	45.0	61.3
48–59	18.4	339	58.0	6.0	13.9	36.9	64.0

(\*) = Data based on fewer than 25 unweighted cases

Source: MICS 2019<sup>[3]</sup>



## Appendix 2

Appendix 2: Prevalence of acute respiratory infections (ARI) and corresponding 95 percent confidence intervals (95% CI)

Provinces	Number of ARI cases	Percentage of acute respiratory infections (95% CI)
Barh Ghazel	864	15.7 (13.4–18.2)
Batha	541	12.4 (9.8–15.3)
Borkou	496	20.6 (16.9–24.4)
Chari-Baguirmi	742	26.8 (23.7–30.3)
Ennedi-East	742	22.3 (19.4–25.2)
Ennedi-West	475	19.4 (15.8–22.9)
Guéra	531	11.4 (8.8–14.2)
Hadjer-Lamis	730	15.4 (12.7–18.1)
Kanem	732	20.8 (17.7–23.9)
Lac	536	13.2 (10.2–16.0)
Logone Occidental	576	66.4 (62.4–70.2)
Logone Oriental	603	57.9 (54.1–61.9)
Mandoul	476	34.5 (30.3–38.4)
Mayo-Kebbi Est	624	32.7 (29.1–36.6)
Mayo-Kebbi Ouest	616	30.0 (26.3–33.8)
Middle Chari	659	39.5 (35.9–43.2)
Ndjamena	557	20.9 (17.7–24.4)
Ouaddaï	609	19.1 (15.9–22.3)
Salamat	575	40.3 (36.4–44.1)
Sila	710	23.0 (19.7–26.0)
Tandjilé	658	23.8 (20.3–27.0)
Tibesti	473	18.4 (15.0–22.2)
Wadi Fira	611	17.0 (13.9–20.0)
<b>Total</b>	<b>14,136</b>	<b>29.4 (28.5–30.3)</b>

Source: National Retrospective SMART Survey of Nutrition and Mortality 2022<sup>[11]</sup>

## Appendix 3

Appendix 3: Child mortality by place of residence in Chad

	Neonatal mortality* (Probability of dying in the first month of life)	Infant mortality* (Probability of dying between birth and first birthday)	Child mortality* (Probability of dying between the first and fifth birthday)	Under-five mortality* (Probability of dying between birth and fifth birthday)
<b>Total</b>	<b>33</b>	<b>79</b>	<b>47</b>	<b>122</b>
<b>Place of residence</b>				
Urban	32	63	32	94
Rural	34	82	50	128
<b>Province</b>				
Barh El Gazal	20	50	25	73
Batha	28	59	39	96
Borkou and Tibesti	8	20	13	33
Chari-Baguirmi	49	114	73	179
Ennedi-East	22	39	11	50
Ennedi-West	9	38	31	68
Guera	26	52	36	86
Hadjer-Lamis	49	97	44	137
Kanem	23	52	41	90
Lake	28	60	50	108
Logone Occidental	43	119	89	197
Logone Oriental	35	113	84	188
Mandoul	45	91	62	148
Mayo-Kebbi East	30	73	62	130
Mayo-Kebbi West	22	63	44	104
Middle Chari	25	71	53	119
N'Djamena	36	72	22	92
Ouaddaï	39	67	19	84
Salamat	20	56	22	78
Sila	21	58	25	81
Tandjile	56	122	40	157
Wadi Fira	7	19	19	38

\*per 1,000 live births

Source: MICS 2019<sup>[3]</sup>

## Appendix 4

Appendix 4: Prevalence of global acute and chronic malnutrition

Provinces	Global acute malnutrition*		Chronic malnutrition**	
	Number of cases	Prevalence % (95% CI)	Number of cases	Prevalence % (95% CI)
Mandoul	385	3.4 (1.9–5.9)	601	17.8 (14.5–21.7)
Middle Chari	549	5.8 (3.8–8.9)	514	19.3 (15.1–24.2)
Tandjilé	568	6.3 (4.4–9.0)	415	21.7 (16.7–27.7)
Logone Occidental	470	6.6 (4.6–9.3)	457	22.3 (17.9–27.5)
Logone Oriental	496	6.9 (5.0–9.4)	634	22.6 (17.4–28.7)
Mayo-Kebi West	541	7.2 (5.2–10.0)	478	23.0 (19.1–27.5)
Lake	470	9.8 (6.4–14.6)	516	23.3 (19.7–27.2)
Ndjamena	484	10.3 (7.7–13.7)	460	25.0 (18.2–33.3)
Tibesti	426	10.6 (6.8–16.0)	711	26.0 (20.6–32.3)
Ouaddaï	544	10.7 (7.9–14.2)	572	26.9 (22.1–32.4)
Sila	658	10.8 (7.8–14.7)	577	28.4 (22.6–35.1)
Borkou	451	10.9 (7.9–14.7)	693	30.3 (25.5–35.6)
Chari-Baguirmi	642	11.4 (8.7–14.7)	820	31.0 (26.6–35.7)
Mayo-Kebi East	509	11.4 (9.2–14.1)	698	31.7 (27.0–36.8)
Hadjer-Lamis	638	13.0 (10.2–16.4)	501	31.9 (27.7–36.5)
Guéra	458	13.1 (9.7–17.5)	678	32.0 (27.7–36.6)
Salamat	523	15.5 (11.4–20.6)	568	34.7 (28.3–41.6)
Batha	463	16.0 (12.9–19.6)	513	36.6 (30.1–43.7)
Wadi Fira	548	16.2 (12.3–21.1)	544	36.8 (31.2–42.7)
Kanem	671	16.2 (13.2–19.9)	546	37.2 (31.7–43.0)
Barh El-Ghazel	763	16.5 (13.3–20.3)	565	38.9 (34.0–44.1)
Ennedi-East	653	17.0 (13.7–20.9)	708	39.1 (34.3–44.2)
Ennedi-West	439	18.5 (14.4–23.3)	526	39.5 (34.4–45.0)
National	12,349	10.9 (10.2–11.7)	13,295	30.4 (29.1–31.7)

\*defined by a Z-score <-2 and/or oedema

\*\*defined by an overall Z-score of <-2 and >=-3 no oedema

Source: National Retrospective SMART Survey of Nutrition and Mortality 2022<sup>[11]</sup>

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