MSF HOLLANDE

CHAD

Vaccination coverage survey after mass vaccination campaign (MVC) against measles in Béré, Dafra and Donomanga districts, Tandjile province, Chad, May/June 2023

Study protocol

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April 2023

First Version : 28 April 2023

First review : 04 Mai 2023

Study design : Two-stage cluster sampling

Study type : Cross-sectional survey

Study participants : Caretakers of children aged 6 -119 months

Study period : 14 May to 11 June 2023

Study site : Béré, Dafra and Donomanga Districts in Tandjile Province

Study team

Name	Title and affiliation	Role in survey
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Khatab Muhy / Audrey van der Schroot	Head of mission Chad MSF-OCA	Co-investigator
Camille Brunel	Project Coordinator CERU MSF OCA	Co-investigator
Prince Alfani	Health Advisor MSF OCA	Co-investigator

Collaborating institutions: Ministry of Health, Chad:

- Health delegate of Tandjile: Adjibera Jean-Baptiste

Contents

List of abreviations

CERU	Chad Emergency Response Unit
CI	Confidence interval
EPI	Extended Program of Immunization
ERB	Ethics Review Board
95% CI	95% confidence interval
HH	Household
MCV	Measles-containing vaccine
MOH	Ministry of Health
MSF	Médecins sans Frontières
MSF-H:	Médecins sans Frontières Hollande
WHO	World Health Organization
ZDRs	Zones of Responsibility

1. Project Summary

Three districts in Tandjile province are affected by a measles outbreak. The most affected age group were children aged 6 months to 9 years with 302 (76%) of all cases reported and attack rate of 184/100,000 children. Routine measles vaccination coverage is low for Béré (2021: 69%, 2022: 59%), Dafra (2021: 73%, 2022: 79%) and Donomanga (2021: 70%%, 2022: 65%).

An MSF mass vaccination campaign targeting children from 6 months to 119 months (37% of the population) will be conducted in Bére (from 02-12 May), in Dafra (from 14-20 May) and in Donomanga (from 23 May to 03 June 2023) in the province of Tandjile in Chad. Survey will be conducted directly following that in Bére from 02-12 May, in Dafra from 14-20 May and in Donomange from 23 May to 03 June 2023.

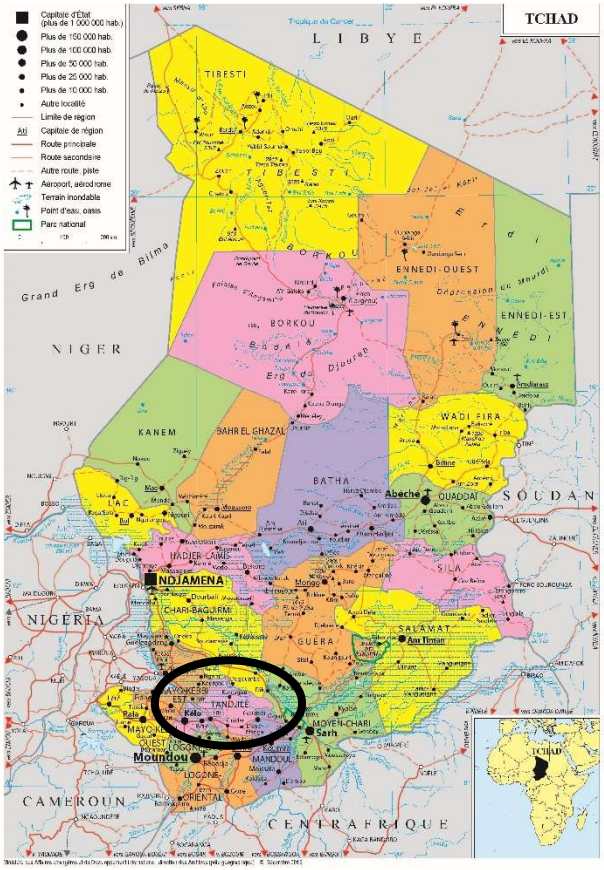
A vaccination coverage survey will be conducted sequentially, following the measles mass vaccination campaign, in 3 districts in Tandjile province in Chad (Béré, Dafra, Donomanga) between 15 May and 11 June 2023 to provide an estimate of the measles vaccination coverage.

2. Context

2.1.Country information

Chad is a large country in north-central Africa, with a population of approximately 18.5 million (estimate for 2023)[1]. The country is divided into 23 regions/provinces; each region is further divided into districts. Based on the 2021/2022 estimates of the Human Development Index[1], Chad is ranked 190 out of 1191 countries. Life expectancy at birth in 2023 is 57 years for men and 62 years for women (estimates for 2023)[2]. The under-five mortality rate is 64/1,000 live births in 2023[1].

Figure 1 : Map of Chad



2.2.MSF presence

MSF-OCA has been present in Chad since 2003. The mission has an emergency project, the Chad Emergency Response Unit (CERU) which provides rapid response in case of an emergency.

2.3.Measles outbreak in Chad

Despite Chad's efforts in the field of immunization, routine EPI vaccine coverage surveys, Demographic and Health Surveys and Multiple Indicator Surveys in Chad (DHS-MICS),

[1] Human Development Report 2021/2022. https://hdr.undp.org/content/human-development-report-2021-22 . Accessed 13 April 2023

[2] CIA World Factbook. https://www.cia.gov/the-world-factbook/countries/chad/. Accessed 13 April 2023

estimates of WHO and UNICEF show that immunization coverage is very low and does not ensure the collective immunity of under-5 year-old children. World Bank reported a measles vaccination coverage of 55% among children aged 23-23 months in 2021[3].

A measles outbreak started in Chad in May 2018 and the transmission chain has not been interrupted since. In general, the measles season starts in March (halfway the dry season) and ends usually in June (start of the rainy season). However, in light of the measles outbreak, cases occur across the year.

In March 2023, measles epidemics were reported for several provinces of the country: 19/23 (83%) of the provinces have at least one district in alert for measles, according to definition of the Ministry of Health (MoH) [4]. As of week 12, 2023, Tandjile is the second most affected province after N'Djamena with 40 cases (11% of all reported cases) reported to IDS in 2023.

Tandjile is one of Chad's 23 provinces and is located in the south of the Chari River, southeast of Ndjamena without any borders to neighboring countries. 75% of the population live in rural areas. Each district is divided into health zones. In total, 116,115 children aged 6 months to 9 years live in the three district, for details see Table 1.

The MoH has reported cases for Donomanga district since week 1, 2023; as of week 11, 2023, 2/3 samples tested IgM positive for measles. Cases for Daffra have been reported since week 2, 2023 and as of week 11, 2023, 6/12 samples tested positive for measles. Cases in Béré have been reported since week 8, 2023 and as of week 11, 2023, 4/7 samples tested positive for measles.

Table 1 : Health zones and population aged 6-119 months per district according to population projection for 2023

District	Zones	Population
Béré	18	47,788
Dafra	7	25,666
Donomanga	19	42,660
Total	44	116,115

An investigation conducted by the CERU reported 398 cases of suspected measles, including 22 deaths (case-fatality ratio: 5.5%), between week 1-13 2023. As of week 13, 2023, the most affected districts in Tandjile are Dafra (global attack rate: 183/100,000, source: implemented line-list in health centers), Donomanga (123/100,000) and Béré (46/100,000). Overall, the age group 6-119 months has been most affected with 302 (76%) of all cases reported and an attack rate of 184/100,000 children.

[3] World Bank. Accessed: 05 April 2023. https://data.worldbank.org/indicator/SH.IMM.MEAS?locations=TD

[4] Definition of a district in alert of a measles outbreak: at least 5 suspected cases within 4 weeks

In January 2021, a nation-wide campaign conducted by the Ministry and its partners (GAVI and WHO) took also place in the province of Tandjilé where administrative coverage reached 110%. However, the reported routine vaccination coverage is low for Béré (2021: 69%, 2022: 59%), Dafra (2021: 73%, 2022: 79%) and Donomanga (2021: 70%%, 2022: 65%). Therefore, the province is still experiencing a measles outbreak with laboratory-confirmed measles cases.

In light of this worrying situation, the following interventions are planned:

- Improve case management by supporting the MOH through capacity building of healthcare staff, and by distributing of free measles case management kits in health centers
- Conduct a vaccination campaign targeting children from 6 months to 119 months old (37% of the population) in the district in Bére from 02-12 May, in Dafra from 14-20 May and in Donomanga from 23 May to 03 June 2023.
- Reinforce the surveillance system and outbreak monitoring in the districts through implementing line-lists, reinforcing case definitions, active case finding and sensitizing the community
- MoH plans a periodic intensification of routine immunization (PIRI) targeting children aged 0-23 months in two districts (Dafra and Donomanga) from 01-07 May 2023, including the measles vaccine for children aged 9-23 months. The MSF team, coordination and headquarter carefully considered this situation and agreed to proceed with the planned vaccination campaign. Children aged 9-23 months will be asked if they were vaccinated during the MoH campaign between 01-07 May 2023 before being vaccinated in Daffra and Donomanga.

2.4.Rationale

A vaccine coverage survey was proposed to estimate the vaccination status of children aged between 6 and 199 months after MSF's mass vaccination campaign for measles in all three districts (Béré, Daffra and Donomanga). The estimate will inform about the need for mop-up vaccination campaigns. Further, the study will inform about reasons why children were not vaccinated during the campaign, which will inform future interventions.

3. Objectives

3.1.Primary objective

To estimate measles-containing vaccination (MCV) coverage in children aged 6 months to 119 months in Béré, Daffra and Donomanga districts after the mass vaccination campaigns against measles implemented by MSF and MOH.

3.2.Secondary Objectives

- To calculate MCV coverage by age group during the MSF vaccination campaign
- To Describe the reasons for non-vaccination during the vaccination campaign
- To provide recommendations for vaccination strategies in this context.
- To calculate the MCV coverage of routine and catch-up vaccination campaigns

- To assess the number of children who have suffered from measles

4. Survey design

The quantitative, cross-sectional study, will use a two-stage cluster sampling design. The following sections will explain the details of the study collection. For each district we will conduct an independent vaccination coverage survey to ensure a sufficient sample size and precision of the results. We will conduct one survey after the other in the order of the vaccination campaign. Because of different local languages, we will have three different teams who will conduct the study to increase the quality of the results.

Each team will receive a two-day training. The second day includes a pilot training in a village, which is not a cluster nor a reserve cluster. The data will be collected by 6 teams, which each consists of two surveyors, during 7 days. We will also have two reserve surveyors in case a surveyor of the delegated teams is unavailable for some time during the study.

5. Target Population

The study targets caregivers (parents or legal guardians) of children aged 6-119 months who live in Bére, Daffra and Donomanga districts.

The target population for this mass vaccination campaign is approximately 73,129 children aged 6 months to 9 years.

5.1.Inclusion criteria

Caregivers of children will be included in the survey if the children satisfy the following criteria:

- Child between 6-119 months old at the time of the vaccination campaign
- Child resides in Béré, Daffra or Donomanga district during the vaccination campaign
- Child belongs to randomly selected households
- Have the free and informed oral consent of the parent or legal guardian of the child aged at least 18 years

5.2.Exclusion criteria

The following caregivers and children will be excluded from the survey:

- Children belonging to a household not drawn by lot
- Any child aged under 6 months and over 119 months at the time of the vaccination campaign
- Households in which the parents or legal guardian (at least 18 years old) of the children are absent on the day of the survey
- Refusal of the parents or legal guardian of the child to participate in the survey

6. Definitions

6.1.Household

A household (HH) is defined as a group of people who are under the responsibility of one person or head of HH and who have slept under the same roof and who have shared meals for at least 2 weeks. All members of the HH meeting the age inclusion criteria will be included, no matter the relation with the other members of the HH.

6.2.Head of household/caretaker

The head of HH is defined as follows:

- Adult HH member ≥ 18 years *and*
- Who has authority on the HH (husband or the oldest family member) *and*
- Who can give accurate information on all demographic issues in his/her household, *and*
- Who self-identified as the head of HH/caretaker

If the official head of HH is absent at the time of the survey, the study interviewers will inquire if any other caretaker in the HH is present at the time of the survey, is able to provide consent for the HH and give accurate information. A HH will be excluded from the survey if none of the HH members fulfills all these criteria.

6.3.Vaccination

MSF will give vaccination cards to children and will mark a finger on the left hand during the vaccination campaign.

- **Vaccinated by card or marker finger**

  The following criteria apply to a child who was vaccinated and who can show proof:

  - The child has a marked finger (in line with the marks given during the vaccination campaign which normally last for two to four weeks after vaccination) or the caregiver can present the vaccination card by MSF or MoH

- **Vaccinated by verbal confirmation**

  The following criteria apply to children who were vaccinated according to verbal confirmation:

  - The parent/guardian/caretaker confirms verbally during an interview that the child was vaccinated during one of the two vaccination campaigns *and*
  - The child has no marked finger and no vaccination card that shows poof of being vaccinated

- **Not vaccinated**

  The following criteria apply to a child who did not receive any dose of MCV during the campaign:

  - No vaccination card demonstrating the vaccination *and*
  - No finger marking which suggests that the child received MCV *and*

- Parent/guardian/caretaker confirms verbally that the child did not receive any MCV during one of the two campaigns

➢ **Unknown**

The following criteria apply to a child with an unknown vaccination status:

- The parents/guardians/caretakers does not recall if the child was vaccinated during the vaccination campaign *and*
- The child has no marked finger suggesting that the vaccination took place nor the vaccination card

7. Sample size and sampling

7.1.Sample size calculation

The sample size was calculated using ENA SMART software (SMART, 2020) based on the following inputs:

- Average household size of 5[5]
- 36.9% of children aged 6 -119 months[6]
- Estimated coverage of 80%
- Confidence intervals of 95%
- Desired precision of 5%
- Design effect of 3:
- Non-response rate of 10%

This returns a sample size of 803 children in 537 households. We will sample 42 clusters, containing each 13 households for a total number of 546 households. There is the risk that a cluster might not exist, is not identifiable or not accessible, which will be addressed by adding up to 5 clusters in reserve.

7.2.Sampling procedure

The vaccination coverage survey will use a two-stage cluster sampling methodology.

➢ **1st stage**: Clusters will be selected based on probability proportional to the population size (PPS), using population data provided by the chef of each health zone. The cluster and reserve clusters are identified by the ENA SMART 2020 software.

➢ **2nd stage:** Spatial Sampling or systematic sampling will be used to select 13 households in each of 42 clusters.

[5] Source: INSEED. Recensement général de la population de l'habitat 2009. https://www.humanitarianresponse.info/fr/operations/chad/document/recensement-general-de-la-population-de-l-habitat-2009-indicateurs-globaux

[6] Projection Démographique DIIS. 2023.

All children in the eligible age range in the identified households are included in the survey, including in the final household of a cluster, even if this exceeds the total target of children for the cluster.

7.2.1. Spatial sampling of households

This will involve making a simple random choice using a spatial sampling method within the polygons corresponding to the clusters selected in the first stage. GPS points will be randomly generated in the polygons selected in the first stage. These points will be visualized beforehand on Google Earth and the points not corresponding to houses will be eliminated.

7.2.2. Systematic random sampling of households

When geographical data are not available or do not allow simple random spatial sampling, systematic random sampling will be used. HH will be selected starting with a randomly selected HH and then applying a regular interval between each HH. The regular interval is the ratio between the number of HH in the village and the number of HH to be visited in this cluster. The survey team will be helped by the village chiefs to determine the limits of the village and to obtain the number of HHs. If the number of households is not known, the survey team will make an initial visit to the village to count the households

7.2.3. Special cases

For the cluster and household selection, the following rules apply in case of special cases:

- If for unforeseeable reasons the cluster is not accessible, it will be replaced by one of the clusters in reserve.
- Abandoned or uninhabited houses and churches will be excluded. The household is ignored and replaced. The next household will be selected according to the sampling procedure. The final cluster size, the number of households at the end of the day, will stay the same.
- If multiple households live in the same compound, one household will be randomly selected by numbering them and generating a random number on the tablet.
- If a household has no children in the age group 6-119 months, the household is not replaced. The team will indicate on the survey sheet that the household had no eligible children. The final cluster size will be decreased by the number of households without any children in the targeted age group.
- If a selected household is not be available after two visits attempts (morning and afternoon), or is not willing to respond, that household will not be replaced. The final cluster size will be decreased by the number of households who are absent or refuse participation. The survey team can ask neighbours why the household is empty (to verify the house is no abandoned), but the team should not fill out the household survey questionnaire by interviewing neighbours about the absent household nor their own households.
- A visitor is defined as anyone who has slept under the same roof and who has shared meals for less than two weeks. Visitors should not be included in the survey

8. Data collection

A standardized pre-piloted questionnaire will be used to collect the following data for each child of the cohort at recruitment:

- Demographic data: household size, age, sex, number of children aged 6 months to 9 years in the household.
  - Data collection through questionnaire
  - The data team will use an event calendar to reduce recall bias when collecting information on age.
- Vaccination history of routine vaccination against measles
  - Routine measles vaccination at 9 months of age or as part of a supplementary measles vaccination campaign
    - Vaccination status according to routine vaccination
    - Actual age when the child received the vaccine
    - Location where the child received the routine immunization
    - Reasons for not receiving the routine immunization
- Vaccination status of each child between 6-119 months of age after the measles vaccination campaign:
  - Vaccination status for each of the measles vaccination campaigns (MoH and MSF) for children in Dafra and Donomanga
  - Vaccination card (if available) to assess the last date of vaccination
  - Finger mark (if applicable) to assess if the child has recent ink marks on the fingers that stem from the vaccination campaign
  - Interview (if none of the above): Verbal confirmation of the child's vaccination status
- Reasons for non-vaccination against measles
  - Reasons given for why caretaker decided not to vaccinate child
    - Vaccines dangerous for the child
    - Previous bad experience with vaccination
    - Vaccines are not beneficial
    - Vaccination is painful for the child
    - Religious beliefs
    - Child was too young
    - Child was too old
    - Child was already vaccinated
  - Caretaker could not vaccinate child during the MSF campaign
    - Did not know that s/he could vaccinate the child
    - Did not know about vaccination campaign

- Vaccination place too far away/too expensive
- Caretaker was working during the campaign
- Family was outside village during campaign
- Child was sick during vaccination campaign
- Vaccinator decided not to vaccinate the child
- Not enough vaccine at the vaccination place
- Vaccination team did not stay long enough

➢ Measles disease
  - Measles status
  - Age when suffering from measles

9. Data entry and analysis

Data will be collected offline using Kobo Collect on tablets. The collected data will be added to a database which is automatically generated in Kobo Collect. Every night, the data will be uploaded to the server.

Data cleaning and analysis serves to monitor inconsistencies in responses and data entry. The epidemiologist will review data quality each evening after synchronization. Data cleaning and analysis will be conducted using R. For each zone, the information will be added if the zone is rural or urban.

The main outcome of the analysis will be the overall vaccination coverage. We will present the total vaccination coverage of children aged 6-119 months during the campaign, from routine immunization and catch-up campaigns. We will assess the frequency of the different reasons for non-vaccination if children were not vaccinated in any of the three vaccination sites.

All estimates will be presented as proportions in percent with their 95% confidence interval (CI). All estimates will be presented as a total but also stratified by two age groups (6-59 months and 60-119 months), by sex, by district and rural/urban area.

For each variable, we will calculate the actual design effect and those with effects greater than 1 will be reported.

10. Ethical principles

The principal investigator is overall responsible for ethical compliance of the study.

The survey will be conducted in accordance with the Council for International Organizations of Medical Sciences (CIOMS) International Ethical Guidelines for Biomedical

Research Involving Human Subjects[7] and International Ethical Guidelines for Epidemiological Studies.[8]

The MSF Ethics Review Board (ERB) approved the standardized survey protocol used in this study. The MSF-OCA Medical Director determined that this particular survey met the ERB's criteria exempting it from further review by the ERB. The Chadian Ministry of Health approved this survey.

The medical coordinator will inform the Chadian Ministry of Health of the survey. Once approved, the project coordinator will inform the district and zonal officials (for zones with selected clusters).

In each cluster, the survey team will inform the chef de quartier or chef de village or chef de canton (as applicable). They will explain the purpose of the survey and what information will be collected. Community engagement shows respect to the community and should improve survey content relevance and enhance security for both survey staff and participants. It will be clearly explained to the heads of the neighborhood/village/canton that they can decline the participation of their area without any consequences or penalty. In this case, the village or neighborhood will be replaced by a reserve cluster.

In the households selected, the interviewer team will explain the purpose of the survey to the head of the household/survey participant or the parents/guardians/caretakers in the language he or she is familiar with and verbal consent obtained to conduct the interviews and documented on the questionnaire. All refusals will be recorded and those forms retained to document participation rate.

The privacy of the participants will be respected during the interviewing process. Staff will be trained in how to assess for appropriate conditions to help maintain confidentiality during the interview process, including choosing the optimal location when a setting makes privacy difficult (e.g. single room dwelling).

All data will be anonymized and electronic files stored password-protected by MSF-OCA. The electronic database will be stored at the MSF Headquarters or country management

[7] Council for International Organizations of Medical Sciences (CIOMS). International Ethical Guidelines for Biomedical Research Involving Human Subjects. CIOMS Geneva 2002. http://www.cioms.ch/index.php/publications/printablev3/541/view_bl/65/bioethics-and-health-policy-guidelines-and-other-normative-documents/19/international-ethical-guidelines-for-biomedical-research-involving-human-subjects?tab=getmybooksTab&is_show_data=1.

[8] Council for International Organizations of Medical Sciences (CIOMS). International Ethical Guidelines for Epidemiological studies. CIOMS Geneva 2009. http://www.cioms.ch/index.php/publications/printablev3/541/view_bl/65/bioethics-and-health-policy-guidelines-and-other-normative-documents/47/international-ethical-guidelines-for-epidemiological-studies?tab=getmybooksTab&is_show_data=1.

level for 5 years after the survey. Access to the survey data will be restricted to the co-investigators of the study and the Medical Coordinator.

MSF-OCA commits to sharing survey results with everybody who has participated in the survey. The local community will be involved and informed through providing survey results to officials in all zones surveyed to pass to the chefs de villages and chefs de cantons.

The MSF medical responsible in the field will advise the study teams on the emergency and non-emergency referral practices when finding sick people in the study villages, and whether to refer unvaccinated participants to a specific health structure to receive missed vaccines or advise them to attend any mop-up campaign that might be offered.

10.1. Verbal consent form

Verbal consent will be sought from every household, with the designated head of household answering the questionnaire for all relevant members of the household. He/she may choose to delegate answering the questionnaire to another member of the household, or to individuals regarding their own vaccination status if relevant.

10.2. Privacy and Confidentiality

Privacy and confidentiality in the data collected from the participants will be ensured both during and after the conduct of the survey. Participant names will not be recorded on questionnaires, and individual person records will be linked only to a household number throughout the data entry and analysis process. Any data that could be combined with other data sources to make individual records potentially identifiable will not be distributed outside the survey location, or appear in any report or publication. If used for spatial sampling, GPS data will be deleted afterward. All participants included in the survey will have the survey activity explained to them in a language with which they are familiar. Everyone will be offered the opportunity to refuse participation in the survey at any time without penalty and no incentives or inducements will be provided to any respondents. Everyone approached for the survey is completely free to participate or not.

10.3. Risks and benefits of the study and contingency plans

The vaccination coverage survey does not cause any physical harm to participants. Nevertheless, asking the interviewees about personal information may feel intrusive and in village contexts there may be limited privacy. Using local staff and careful training on interview-techniques can mitigate this.

There are no direct immediate benefits from this survey. However, benefits can be seen at the community level. A better understanding of the vaccination coverage ratios and causes of non-vaccination in the area will allow to better tailor immunization programming and to use

resources more efficiently. Accurate data on vaccination status are of tremendous importance for advocacy on national and international level.

11. Collaboration teams

The study will be carried out in collaboration between MSF-OCA and the MoH of Chad. MSF study team is in discussions with the MoH to identify the most appropriate collaborator(s) to be included in this team.

MSF-OCA is the study sponsor and is responsible for the funding. It is in charge of the field part of the survey, the analysis and report writing. Permission for publication must be obtained from MSF-OCA and the MOH. Survey results will belong to MSF-OCA and the MOH of Chad.

12. Implementation of the survey in the field

12.1. Selection and tasks of the survey teams

The task of the interviewers will be to collect the necessary data for the survey. Each survey team is composed of two interviewers. To finalize the field part in a reasonable time we need six survey teams of two persons.

General selection criteria for all interviewers

- Fluent in French (speaking, reading and writing), and fluent in speaking and understanding Chadian Arabic and the local language of the respective district
- Available for the ENTIRE time of the survey (training and interview days),
- If necessary: Willing and able to work on Saturdays and Sundays during the survey time,
- Motivated to participate in the survey,
- Have no known conflict of interest,
- Experience with surveys and/or community health work would be an advantage

12.2. Supervision

The survey teams will be supervised by the Mission Epidemiologist and CERU's Data Manager. The principal investigator is the overall responsible for the final version of the protocol, the quality of the research, the data analysis and report writing.

The principal investigator will ensure that the following tasks are performed:

- Preparation of all necessary documents (protocol, questionnaires) for the survey
- Secure the necessary local approvals (including that of the local ethics committee if needed)
- Preparation of the field component of the survey (training of the study teams, logistics, materials) together with the MSF team in the field
- Follow-up of the field component of the survey
- Data entry or training of a data entry clerk
- Data quality checking and analysis
- Report writing
- Ensuring ethical compliance during implementation of the study through supervision and training

12.3. Suggested MSF Support in the field

- Administrative support for survey preparation at the field level and during field part, such as communication with country and local-level authorities.
- Human resources support, such as assistance with hiring of interviewers, payment of interviewers, and administrative tasks related to interviewers.
- Logistic support for survey preparation at the field level and during field part, such as organization of drivers and cars, communication tools, stationary, printing of information forms, coordination of movement planning.

12.4. Training of the survey team and pre-testing of the questionnaires

We will conduct two days of training for the data collectors. The training will give background on the survey and methodology; practice with tablets, questionnaires, and sampling methodology; the participants will become familiar with the information sheet and informed consent. The training will be conducted in French. It will include an intensive review of the questionnaire and practice with the tablets. As the interviews will be conducted in local languages, the team will discuss the survey and agree upon the correct wording for each question. On the second day, surveyors will conduct pilot surveys at points accessible by foot. The principal investigator will supervise all data collection teams at least once during the pilot. This piloting will allow for supervised practice in real-world conditions. If no major issues are noted during the pilot, and no changes to the survey follow the pilot, the pilot surveys will be included in the final data analysis.

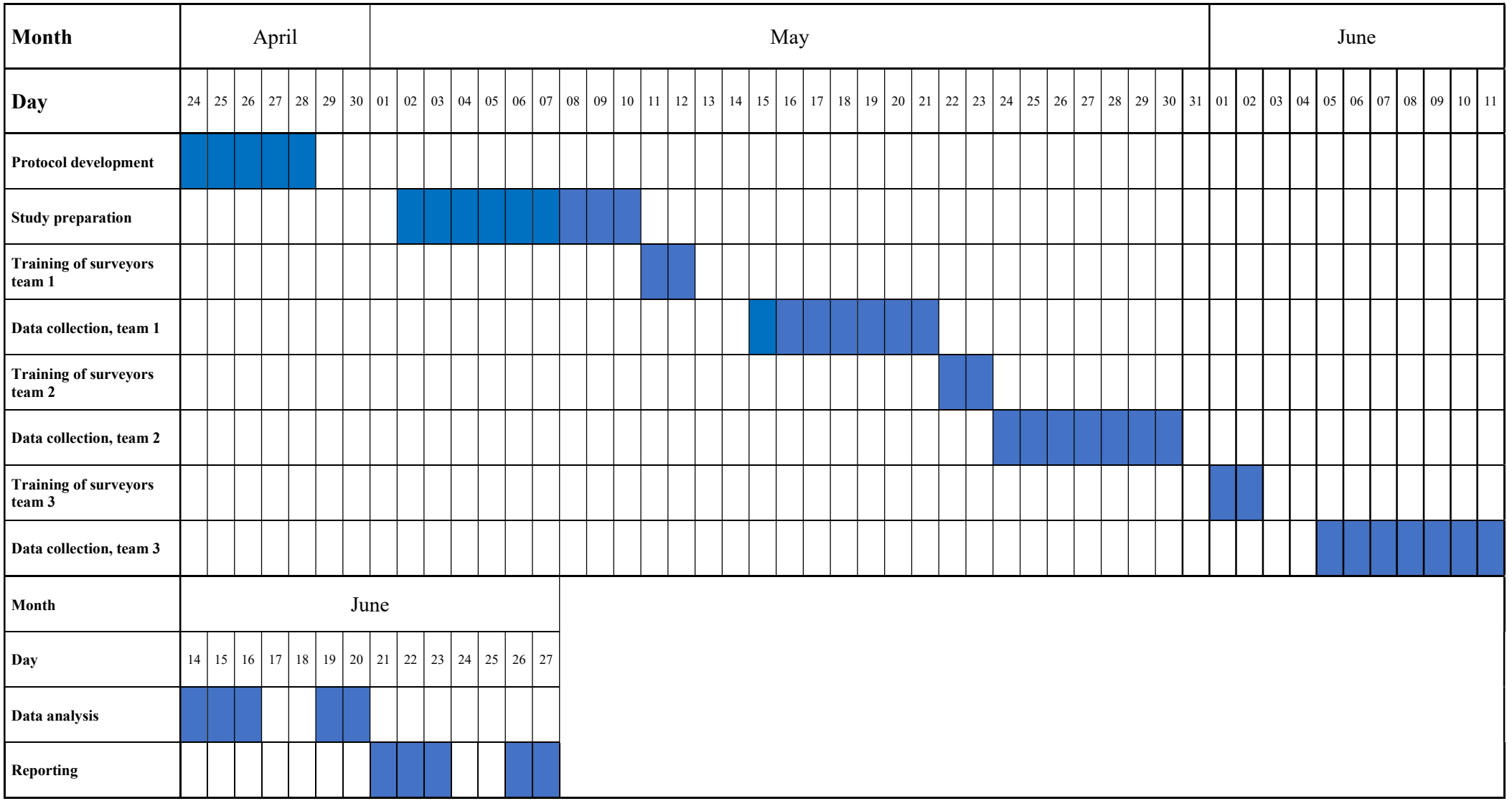
Training materials will be developed specifically for this context and training methods will be participatory with a focus on practical exercises (e.g. role-play, problem solving, discussion etc.). They will provide the opportunity for the team to reflect upon and share their

existing knowledge and experience. The training will be complemented by ongoing supervision and support, largely through daily debriefings, to address any issues arising.

12.5. Timeframe in the field

A schedule is planned as follows:

- **Start date :** 24 April 2023
- **Protocol development:** 5 working days from 24-28 April 2023
- **Ethics review:** Not needed
- **Study preparation:** 9 days from 02-10 May 2023
  - questionnaire programming, logistical planning (cars/security), photocopies, recruitment of interviewers, training materials for survey teams
- **Data training and pilot in Béré :** 2 days from 11-12 May 2023
- **Data collection in Béré:** 7 days from 15-21 May 2023
- **Data training and pilot in Dafra :** 2 days from 22-23 May 2023
- **Data collection in Dafra :** 7 days from 24-30 May 2023
- **Data training and pilot in Donomanga :** 2 days from 01-02 June 2023
- **Data collection in Donomanga:** 7 days from 05-11 June 2023
- **Data analysis:** 5 working days from 14-20 June 2023
- **Write up (report):** 5 working days from 21-27 June 2023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Protocol development
Study preparation
Training of surveyors team 1
Data collection, team 1
Training of surveyors team 2
Data collection, team 2
Training of surveyors team 3
Data collection, team 3
Month
June
Day
14 15 16 17 18 19 20 21 22 23 24 25 26 27
Data analysis
Reporting

13. Logistic

Supplies and transport will been facilitated/supported by CERU.

13.1. Supply needed

Supplies for the conduct of the survey will be purchased at project level. See below for a list of required supplies. The principal investigator will develop vaccination coverage questionnaires. Photocopies of all necessary documents will be done in Bongor.

Item	# per team	Total
Tablet	1	6 + 2 reserve
Powerbank	1	6
Clipboard or folder	2	12
Notebook (for training)	2	12
Pen	2	12
MSF identification (armband, vest, etc.)	2	12
Bottles of Water	24	144

13.2. Transport Needed

Eight vehicles (six for data collection teams and two for study supervisors) for data collection on 7 survey days per district, resulting in 21 days in total.

14. Knowledge dissemination

A final report will be produced and shared with the study team, the mission, the MSF community, MOH, and other relevant actors. Relevant results may be submitted for publication in a peer-reviewed journal to contribute to the wider research community.

15. Impact

This survey will provide an estimate of measles vaccination coverage in Béré, Daffra and Donomanga districts to inform decision-making and resource allocation for MSF and MOH activities. This will contribute to health programs with a positive impact on the health status of the population of Tandjile province.

16. Limitations

There are limitations in planning and conducting this study that may impact the findings. Population estimates used for cluster allocation are based on numbers from the chef of the health zones. This method may not account for population movements or population growth beyond the average. This could reduce the validity of the data.

There is also a possibility for social desirability bias: The respondents are more likely to respond in a way that they think will be viewed more favorably by the study team, leading to information bias. To reduce social desirability bias, the questions will be discussed with the study team to ensure high community acceptance and to improve wording to reduce social desirability bias.

There may also be recall bias, especially regarding the age of children, the age of children when receiving the MCV and the vaccination history. To reduce the recall bias of the age, the study team will work with an event calendar. To reduce the recall bias of the vaccination status, the team will always ask for the vaccination card; for the vaccination status after the campaign, the team will also look for a marked finger.

There is also a possibility of selection bias. Individuals who are away and cannot be reached on the day of the survey will not be included in the analysis. This may impact the validity of findings if the characteristics of the absent individuals differ systematically from those who are present. Families of absent heads of households may have a lower health status than those who are present: for example, caretakers of sick children may have left their household to attend a health clinic. However, the absent household head may have a more healthy family: For example, healthy individuals, who have left to work for the day, may have more resources to afford health services. To reduce bias by absent households, the team will alert village leaders of the date and time of the data collection to avoid any conflicts with market days or other scheduled events.