

# The importance of strengthening public health systems based on primary health care in designing a successful vaccination strategy: an example of qualitative research in three regions of Senegal.

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## Research article

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# Abstract

**Background** Because of its low cost and its capability in reducing child mortality and morbidity, vaccination is considered a successful preventive deed in Low and Middle-Income Countries. In Senegal, vaccines are provided free of charge by the public health system, but the provision of the service is not evenly distributed between and within the Regions. Our study aimed at identifying barriers and enabling factors towards vaccination in three Regions of Senegal. **Methods** We performed 41 face-to-face semi-structured interviews with health services' workers and three focus groups with local women in nine different structures in three different Regions of Senegal. We combined health workers' (HW) and mothers' points of view with direct observation in order to fulfill our purpose. **Results** We identified three groups of barriers – structural, personal and psychological – and many subthemes for each of them. Structural and personal barriers such as inadequacy of health structures, shortage of HW, lack of money, distance between villages and health facilities and lack of public transport, hamper mothers from utilising the vaccination service, even when they want to. The lack of effective communication between health personnel and mothers, the lack of collaboration between traditional and conventional medicine and the lack of trust in the public health system as a whole, are major problems to the vaccination uptake too. **Conclusions** The interlink of several elements in conditioning vaccination coverage suggests the need of implementing global and national strategies to overcome them. The key factor is the presence of a solid health system, publicly funded, based on primary health care. On the other hand, context-specific determinants cannot be detected based on global and non-specific information. The role of community health workers (CHWs) is crucial in overcoming wrong beliefs, lack of knowledge and distrust. They must be regarded as a bridge between HW and population. CHWs should be formally included in the organization of the social-health system, adequately formed and enhanced.

## Background

Vaccination is a successful and cost effective public health preventive action in reducing child morbidity and mortality worldwide, and especially in [Low and Middle-Income Countries](#) (LMICs). [1]

In Senegal, the national immunization schedule recommended by the Expanded Program on Immunization (EPI), following the World Health Organization (WHO) guidelines starts with the *Bacille Calmette-Guérin* (BCG) and Oral Polio Vaccine (OPV) at birth. These are followed by Pentavalent vaccine (including Diphtheria-Tetanus-Pertussis (DPT), *Haemophilus influenzae type b* and hepatitis B antigens) and OPV at 6, 10 and 14 weeks. Lastly, immunization for measles and yellow fever (*Vaccin Anti-Amaril*, VAA) is given at 9 months, with the second doses of Measles Containing Vaccine (MCV) foreseen at 15 months. [2]

According to WHO reports, in Senegal, overall 72.2% of children are fully immunized, with important differences among regions. The highest vaccination coverage (VC) rate was found in the Dakar region, the lowest in the south-east of Senegal, including Tambacounda, Kolda, Sedhiou, Ziguinchor and

Kedougou. The VC is 89.2% for the three Pentavalent vaccine doses, 83.7% for OPV and 79.2% for MCV. [2]

Vaccines are provided free of charge by the public health system in the local health structures: *Poste de Santé* (PS) and *Centre de Santé* (CS). In fact, they represent the place where the population applies to have their needs and health problems answered. The vaccination service is carried out in these structures, every day in the CS and one or more than once a week in the PS, depending on the availability of health workers and the size of population served.

The vaccination program in Senegal is characterized by three different vaccination strategies, named *fixed*, *advanced* and *mobile*. Every PS and CS has a *fixed* vaccination strategy, which provides vaccination inside the health structure. *Advanced* and *mobile* strategies are provided for the villages located more than 5 and 15 km from the health structures, respectively. Health workers, both qualified and unskilled, provide vaccination services.

Despite the benefits of different immunizations strategies, in some areas VC are often low or in need of improvement. In fact, VC varies widely between different regions and also within them, according to urban or rural territory, characteristics of the cities and socio-economic status of the target population. [3] Factors affecting VC are both parents' attitudes, beliefs and knowledge on vaccination, the social context and the health service organization. [4] Various perceived barriers for people to use vaccination services have been identified both in developed and developing countries. The main obstacles found are related to family characteristics and organization of the immunization system. [4] A recent systematic review (SR) including quantitative studies from developed countries too, explored also psychological predictors of vaccine uptake. This SR pointed out the importance of considering the context to design a multi-faceted approach to improve vaccine coverage. In many studies included in the SR, low educational level and low socioeconomic status were often associated with low VC. [5]

Therefore, policies and practices in public health are context specific. It is crucial to adequately know the enabling factors and the possible barriers in order to predict the feasibility and benefits of any action. From the foregoing, it transpires the advantages of using a qualitative grounded research methodology that can help mapping socio-economic situations, organization of services, and people's perceptions. [6]

Our study aimed at identifying barriers and enabling factors towards vaccination in three Regions of Senegal, by field observation in the health structures, and by interviewing health workers and women. To our knowledge, there are no studies that have explored the perceived barriers both by professionals who work in health services, and mothers who utilize them in a developing country.

## Methods

### Study setting

The study was set in three Regions of Senegal: Dakar, Kaolack and Sedhiou. In each Region, three community health structures have been involved (two PS and one CS), both in urban and in rural contexts. In Dakar, the environs of the involved facilities are characterised by socio-economic deprivation and low level of education compared to other quarters of the city. The urban areas of Kaolack and Sedhiou present a similar level of socio-economic status and education. In these places, there is a high level of unemployment, and people try to survive mainly through small business activities. In the rural areas, population live in small villages with an important role of the traditional family. They usually are small-scale subsistence seasonal farmers and they have no other work opportunities.

The Senegalese Ethical Committee approved our study (Protocol SEN18/57).

## **Data collection**

Firstly, two medical doctor (MD) interns in Public Health, one male and one female, with the help of a local interpreter, performed a qualitative study. They stayed a few days in every PS and CS where the study took place, to meet and know the workers and observe their job, sharing meals and informal moments too.

The two MDs interviewed health workers of the involved structures, using face-to-face semi-structured interviews (SSIs), whose track is shown in Table 1. Goals and rationale of the study were explained previous to perform the interviews. Written informed consent was obtained from all the participants. At least one person for each role in each structure was interviewed, using a convenience sampling.

The interview protocol, based on a previous literature review, investigated the problems health workers face in their routine working activities, particularly the problems towards vaccination, beliefs and perceptions of the population.

The interviewed personnel included both qualified health workers (QHWs), such as doctors, nurses and midwives, and untrained health workers (UHWs), such as matrons and nurse's aides. Moreover, unskilled community health workers (CHWs), who carry out activities of health promotion in the villages and quarters of the cities (*Relais communautaires* and *Badjenu Gox*), were involved too.

In a second phase of the study, the same two MDs carried out three Focus Groups (FGs), one for each region. When necessary, a local interpreter supported them to understand local languages. The aim of the FGs was to explore the perceived barriers and enabling factors to access vaccination services by involved parents' attitudes, feelings, thoughts toward vaccination and suggestions from mothers on how to overcome barriers. Each FG consisted of a small group of fifteen to twenty-five women who referred to the structure involved and accepted to participate in the project. CHWs were informed of the study objectives and they were requested to select the participants and to take part in the FGs.

The two researchers conducted the interviews and the focus groups from September 2018 to December 2018, after having received training in Italy by a nurse researcher expert in FGs. SSIs, lasting between 30 minutes and 1 hour, and FGs, lasting about two hours, were recorded, transcribed in French and summarized. Written informed consent was obtained from all the participants prior to the start of both SSI and FG.

In addition, data coming from the registers of activity and from field observation performed by the two MDs during the four months of the study integrated the other information.

## **Data analysis**

Both MDs involved in the research explored textual data in form of transcripts in French of SSIs and FGs to identify key themes and concepts. Therefore, the two researchers coded independently the content of the transcripts to identify reasons that could influence people's access to the immunization program. As a further check on coherence and interpretation, the codification of the two MDs was compared, and each theme was discussed. Thus, a framework organized in macro-areas was built, and themes were grouped to facilitate interpretations. [7] [8] [9]

Finally, results from analysis were shared with all the participants and all the workers of the PS and CS involved in the study.

In order to write the final manuscript, a translation from French to English was done.

## **Results**

In total, 41 SSIs to PS and CS' workers and 3 FGs with local women were performed. Among the workers, 3 subjects were CHWs, and 38 were professional health workers, 27 of these QHWs and 11 UHWs. The 3 FGs involved a total of 61 women aged 16-65 years, with low level, or nil, education; 24 (40%) of them were unemployed or seasonal farmers, 21 (34%) worked in small business or craft industry, 8 (13%) defined themselves as housekeepers and 8 (13%) made other kind of works such as restaurateur or hairdresser. All the women had at least one and maximum 9 children (average 4.1, median 4).

SSIs and FGs permitted to identify with a satisfactory saturation of data the barriers to the vaccine uptake in the involved areas, identifying three main barriers – structural, personal and psychological – and many subthemes for each of them.

### **Structural Barriers**

#### ***Environmental problem***

Site-specific difficulties were pointed out. Some PS, especially in urban areas, can be unknown to a part of the local population because they are not fixed as they are on rent. The choice of the structures position itself can be due to economic reasons or opportunities, and it is not thought to be appropriately located for a population's easier access.

*"There is a communication problem with the population. We moved here to this place at the beginning of 2016 –we are renting here- and some people do not know that we are here. Maybe they go elsewhere. Not many people come to this Poste de Santé for vaccinations, but for consultation too."*

Differences in position, access and services between the PSs/CSs can be a cause of overcrowding. The influx of people from areas of competence of other PS can affect the predictions and result in vaccine shortages. In addition, it raises several difficulties in the follow up of the children and in monitoring the compliance to the immunization schedule.

### ***Health system organization***

The absence of informatics support to the immunization program can make it harder to know who has accomplished vaccination and who has not, the paper records being limited in their support to monitoring and sharing information.

*"Data records and the lack of patient's access code are a major problem. Data are not recorded in the computer. There are sheets that come off, there are sheets that deteriorate and, of course, we have numbering problems!"*

### ***Inadequate health structures***

A common problem pointed out by the health workers is the lack of space in the health structures. The buildings are often old, crumbling, promiscuous, not aerated and unbearably hot, bringing discomfort and health risks for both the workers and the patients. In all the PS involved in the study, an appropriated waiting area and a room dedicated to the vaccination service is missing. Moreover, most of the health facilities have not enough tables, chairs and beds, and are often out of material such as gloves, gauze, etc. All these factors can act as deterrents for patients even for the access to a service free of charge such as vaccination, and bring inefficiencies to the service.

*"The examination table is beside the mothers that come to immunize their children, and right next to them we have the delivery room... thus, there is no privacy. (...) The beds are old and we have not enough chairs and tables. The rooms are too small, they are like telephone booths: there is no air! They are not suitable, especially during the rainy season, when it's too hot"*

### ***Unhealthy environment***

Health workers suggested hygiene problems as a further disincentive and risk for the people to come to the PS/CS. Around the building site it is common to find garbage and farm animals, and the cleaning crew is not trained to clean up health facilities.

*“The housekeepers are not properly trained: here it is different from cleaning houses, and from cleaning in non-healthcare’s environments.”*

In addition to this, we observed that basic hygiene standards such as hand washing were not always complied with, sometimes for lack of knowledge and supports such as antiseptics or even running water.

### ***Health workers’ shortage***

Shortage of qualified and not qualified personnel and lack of remuneration are a major problem for the proper functioning of vaccination’s service. Work’s instability and overload may lead to lower quality of the service and to the curtailed staff’s availability and empathy pointed out during the FGs.

*“There is an important shortage of personnel, especially now that we have some strikes too. Sometimes I’m alone here in to immunize the children, and I have to fill the books at the same time! We have a lot of work over here. When we immunize the children, we usually check the nutritional status too...”*

### ***Problems related to vaccine formulation***

The usage of multi-dose vial for vaccines, such as BCG and VAA, that are cheaper and easier to store [10], can bring logistic problems and become a significant obstacle to capillary vaccination. In fact, since multi-dose vial lasts around 6 hours once opened, daily immunization service is impossible in PSs and CSs that serve a small population.

*“Another explication I can give is that in the Poste de Santé they can’t use vaccines that have 20 doses. They need to wait to have enough children to immunize to finish the vaccine’s box and not to waste any dose. For that reason, we have women that bring their child to the Centre de Santé, to be sure he/she can be vaccinated the very day.”*

### **Personal barriers**

#### ***Transport***

People face difficulties in reaching health facilities. In rural areas, the use of ox carts (the only public transport) to walk down the unpaved roads represents an obstacle, especially during the rainy season. In the cities, there is a lack of public transport or, if present, it costs too much and mothers frequently cannot afford it. Both in rural and in urban areas, the responsibility concerning their children health and vaccination was left only to the mother. However, particularly in rural areas, they do not manage the household's finances and they cannot move from their house. As a consequence, it represents an obstacle to the vaccination uptake.

*"Yes, mothers often can't reach the PS because of transport problems and lack of money. In these situations they prefer not to come".*

In fact, implementation of mobile and advanced immunization strategy risks leading to access problems; health workers suggested that the actual journey time between the villages and the health facilities and the availability and cost of transport should be considered.

### ***Opening hours***

Health facilities guarantee the immunization activities from the morning to the early afternoon. This opening time does not fit with working hours, leading to access problems in particular in the urban areas where more people have a job.

*"Advanced vaccination strategy is very useful in order to achieve the established goals in vaccination coverage. However, there are some mothers that don't respect the vaccination schedule both because they ignore the importance and because they often can't come here: they have no time during the day before the PS closes, because of work".*

### ***Waiting time***

Health facilities are often overcrowded and overworked; they also suffer from a shortage of staff. In some cases, the long waiting times and the not daily availability represent a disincentive. It happens that some mothers, even if they are aware of the importance of immunization, do not wait for their turn and renounce to give vaccination to their children.

### ***Vaccination card***

It is frequent that mothers lose their children's vaccination card.

*“A mother came to the vaccination service with her son without the vaccination card. She has lost it long time ago. We were not able to find his vaccination schedule in the paper registers to know which vaccines he had to do”.*

## **Psychological barriers**

### ***Knowledge of vaccination importance***

In some areas, the low educational level causes difficulties in understanding the importance of immunization.

During one of the FGs, a woman said: *“The information meeting that CHWs organise to explain us the importance of vaccination is crucial to enhance it and to help the compliance”.*

Because of the lack of knowledge and for negligence too, mothers often forget the booster schedule.

### ***Traditional non-conventional medicine***

The distrust in the public health system causes a lack of awareness in public health interventions, including vaccination. This leads to the persistence of belief in non-conventional medicine. During a SSI, a doctor highlighted the importance of CHWs in improving trust in the public system and vaccination, and in undertaking health promotion and information activities. Moreover, during one FG, the CHWs have found themselves explaining to the other women the risks of fever as a side effect of vaccination.

The proximity to traditional healers and the difficulty in accessing conventional medicine due to the distance and the lack of financial resources, make it easy giving trust to traditional non-conventional medicine, especially in rural areas. In fact, traditional medicine usually gives an easy, quick and affordable answer. Moreover, as a consequence of mistrust and lack of understanding between traditional healers and conventional health workers, some traditional healers discourage the access to the health system. The interviews showed also that collaboration is possible and useful, and they can be allied in building bridges between services and population, if involved in activities of health promotion.

*“The public health system organized the courses to train the traditional healers on the patients that have to be referred to the hospital. (...) Some years ago there used to be a conflict between traditional healers and us. Now, fortunately, the situation got better, and we collaborate”.*

## **Beliefs**

As a consequence of the point explained above, some feelings of fear persists towards the side effects of vaccination. For example, a baby cry (and other mild side effects) during the administration of a vaccine is a risk factor for mistrust.

Immigrant people from poorer African countries (particularly from Guinea) are scared of immunization because they think it is a way to make them infertile.

*“Woman from Guinea don't want their children being vaccinated, they are reluctant and scared. We don't know how to convince them that vaccination isn't a risk factor for infertility.”*

The nurse that revealed this issue highlighted the importance of CHWs activities in undermining also other beliefs and resistances. Lack of knowledge and distrust in public system, combined with the incapability of health workers to give clear explanations and reassurances about immunization, has brought to false myths and fears.

## Discussion

In this study, we explored factors influencing the uptake of vaccination from both the health workers' and mothers' point of view. We chose not to separate the information coming from health workers' interviews and FGs with women because the results were synergistic, not conflicting and gave us a more complete picture. This result appears to contradict a research carried out in Kenya, in which FGs with mothers revealed a lot of problems that interviews with health workers and clients had hidden. Anyway, it highlights the importance of meshing different methods in realizing a project like ours. [4] In a few cases, we found a peculiarity in one specific source of information. In those cases, we specified the source.

In Senegal, the immunization service is offered in a public context, and it is free of charge for users. In general, mothers appeared aware of the importance of vaccinating their children, as shown both by the FGs and health workers' interviews. In fact, the majority of people perceive immunization as necessary. However, many barriers emerged from our study. We divided perceived barriers in structural, personal and psychological through the content analysis of the transcriptions of interviews. The first two groups of barriers hamper mothers from utilising the vaccination service, even when they want to. In the last one, we included problems related to beliefs, lack of information, mistrust and lack of tools to permit people to better understand and to make informed decisions for themselves, their children and community health.

To this concern, the inadequacy of health system organization and health facilities, the shortage of health workers, the lack of money, the distance between villages and health facilities and the lack of public transport are important barriers. [11] The lack of effective communication and information between health personnel and mothers, and the lack of trust in the public health system as a whole, is a major problem to the vaccination uptake too, from mothers' experience. [12]

The use of traditional medicine is another risk factor for low vaccination coverage. The interviews pointed out that traditional healers do not support the use of the official health system, which includes

vaccination. Other authors pointed out that the use of traditional healers by population is negatively associated with vaccination services access. [13] However, many experiences showed that collaboration between traditional and conventional medicine in developing countries is possible and it would be useful and crucial in overcoming the mistrust that in some areas people have against the health system. [14]

Different areas involved in the present study are profoundly different in relation to the geographic characteristics and to the socio-economic status of the population, as explained above. Nevertheless, cultural resistance towards vaccination didn't emerge as a main obstacle. Interviews and FGs revealed the structural and personal barriers as the most difficult to overcome. In general, resistances are more frequent if low socio-economic status and educational level are associated with a lack of health promotion actions. In fact, from QHWs' point of view, the role of CHWs is crucial in enabling the overcoming of psychological barriers (beliefs, lack of knowledge and distrust). CHWs activities are very important in reinforcing communication and information. Their role must be regarded as a bridge between health workers and population. CHWs are involved in many activities both within the community and the villages and associated with the health facilities. [15] They are crucial in providing health information, encouraging to utilise health facilities and services, helping to cope with health problems and needs, and to understand the importance of health action, such as vaccination. [16] [17] On the other hand, a lack of adequate valorisation of the role of CHWs by the social-health system emerged. In fact, they are figures not formally included in the organization of the social-health system, leading to lack of training programs and institutional and economical valorisation. Their activities are, therefore, varied and discretionary.

Some of the barriers described are present both in LMICs and in High Income Countries (HICs). Others are more relevant in the first or in the second group of countries. Regarding this concern, structural barriers, such as distance from health facilities, lack of transport and money weigh more heavily on LMICs. This was found also in our study, and it confirms the results of the SR cited before [4], in which socio-economic status – including education, literacy, beliefs and financial conditions – appears as the major barrier. In HICs, it seems that resistances and vaccine hesitancy are related both to the educational level and to a general distrust in elites and experts linked to political and historical aspects. [18] Moreover, recent research and evidences show that LMICs are being faced with vaccine hesitancy as an obstacle to the increase of vaccine coverage and programme efficacy. [19] [20] In both groups of countries, the presence of a vaccination service free of charge, close to the people, and managing to be tailored to their needs emerged as very important. Communication with parents appears crucial in every context. In LMICs, these communication barriers can be divided in inadequate delivery of information by CHWs, UHWs and QHWs, lack of attention to address and clarify parents' concerns as a consequence of language barriers between population and QHWs. [21]

As already underlined, providing clear explanations appears to be important in those contexts in which under-vaccination is strongly associated with low educational level. [22] However, it is a crucial theme also in HICs to overcome resistances, misinformation and false beliefs that Internet and social media and mistrust in health systems contribute to spread. [22] Globally, the most effective strategies for addressing

indecision around accepting a vaccination focus on raising knowledge and awareness, and they are dialogue-based. [23] The FGs pointed out the importance of feeling empathy and understanding among QHWs and UHWs to keeping trust them.

This study has some limitations. Limited time and resources for the investigation let the two MDs to make only three FGs and to visit a limited number of structures. Moreover, these structures were chosen among the ones of the three Regions involved in a cooperation program. Anyway, in each Region one CS, and one rural and one urban PS were involved to ensure the most possible variability of structures. The presence of a selection bias in women participating to the FGs because of the choice by the CHWs has also to be considered. Moreover, in the results analysis and description, differences between rural and urban context are pointed out only when some discrepancies emerged. The lack of origin specification means that the aspect is present in both areas, and it acts equally as barrier or enabling factor.

The present study has also some strengths. First of all, the same public health MDs designed the project and conducted all the research process. In fact, interviews and FGs analysis benefitted from and were completed by observation and informal exchange of opinions with the stakeholders. [24] Moreover, the project involved health workers and population's point of view. The inclusion of both of them and the use of different research methods – interviews, FGs, direct field observation and consultation of activities registers – permit to broaden the understanding of the situation.

*More research on different regional vaccination rates and difficulties related to a successful vaccination strategy could be useful to determine how to overcome them. Moreover, it is needed to involve different stakeholders, in particular local policy makers to discuss how to design a vaccination strategy able to overcome the barriers, and how to insert it in a more inclusive health system based on primary health care.*

It is urgent exploring these concerns about vaccination using different research methodology. Both epidemiological studies and social science researches can substantively contribute to develop appropriate strategies to the different contexts and provide evidences to policy makers. [25] [26]

## Conclusions

The comparison between results of our study and factors described in literature for other countries and especially for LMICs represents an effort to understand the complexity of reality. The interconnection of multiple factors in conditioning vaccination coverage suggests the need of implementing global and national strategies to overcome them. The main determinant is the presence of a strong and free health system, publicly funded, based on primary health care and on prevention and promotion activities. At the same time, the context-specific determinants have to be investigated engaging at any time health workers and population' perceptions because they cannot be forecasted based on global and non-specific information.

# List Of Abbreviations

BCG: Bacille Calmette-Guérin

CHW: Community Health Worker

CS: Centre de Santé

DTP: Diphtheria-Tetanus-Pertussis

EPI: Expanded Program on Immunization

FG: Focus Group

HIC: High Income Country

HW: Health Worker

LMIC: Low-Middle Income Country

MCV: Measles Containing Vaccine

MD: Medical Doctor

OPV: Oral Polio Vaccine

PADESS: Programme d'Appui au Développement Economique et Social du Sénégal

PS: Poste de Santé

QHW: Qualified Health Worker

SR: Systematic Review

SSI: Semi-Structured Interviews

UHW: Untrained Health Workers

VAA: Vaccin Anti-Amaril

VC: Vaccination Coverage

WHO: World Health Organization

## Declarations

**Ethics approval and consent to participate**

Written informed consent was obtained from all the participants prior to the start of both SSI and FG. No people under the age of 16 years old were involved in neither the SSI nor the FG. The *Comité National d’Ethique pour la Recherche en Santé* of the *Ministère de la Santé et de l’Action sociale* approved our study (*Protocole SEN18/57*, ethical and scientific opinion N°0005/MSAS/DPRS/CNERS).

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

Not applicable.

### **Competing interest**

The author Sara Boccalini is a member of the editorial board (Associate Editor) of this journal. The other authors declare that they have no competing interests.

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### **Authors' contributions**

JB and CM have designed the study, performed the research in Senegal, analysed and interpreted data and written the draft of the article. MJCP has contributed to the conception of the study and supervised the field research in Senegal. GB has contributed to the design of the study. AB, PB and SB have substantively revised the article.

All authors read and approved the final manuscript.

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## Table

Table 1 Track for the face-to-face semi-structured interviews (SSIs)

In your opinion, what are the main problems to provide an adequate health care in your <i>Poste/Centre de Santé</i> ? (infrastructure and facilities, accessibility, clinical and organizational protocols, human resources, organization, legislation, collaboration with other services, Community health workers and reference hospital, etc)
Focusing on the immunization program, what are the main problems you find doing your job?
What are in your opinion the main obstacles for the population living in the area served by this health facility to access the service?
In your opinion, what are the priorities for improving the quality of health services –in particular the immunization program- in this <i>Poste/Centre de Santé</i> and its reference area?
What is your role during the immunization service, and what are the main actors in the service?
Would you and your colleagues benefit from a training on immunization? Who would benefit the most and why in the <i>Poste/Centre de Santé</i> ?

## Supplementary Files

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