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A Qualitative Cross-Sectional Study Aimed at Identifying Barriers to Accessing Routine Vaccinations and Strategies for Improvement: Perspectives from Healthcare Workers in the City of Buea in Cameroon

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ABSTRACT

Background: Vaccination is a vital public health intervention that has saved millions of lives worldwide. In Cameroon, however, challenges persist in vaccination coverage, especially in the Buea region, where access and uptake remain uneven. This study aimed to assess the barriers to routine vaccination access in Buea from the perspectives of healthcare workers and identify strategies to improve vaccination coverage in children below five years.

Methods: The study used qualitative research design with in-depth interviews based on the WHO BeSD tool. Healthcare workers, including nurses and midwives with at least one year of vaccination experience, were recruited from various health facilities in the city of Buea. The interviews explored participants' views on vaccination access, barriers, and potential solutions. Audio recordings were transcribed, and thematic analysis was carried out using Dedoose software.

Results: Sixteen female healthcare providers, with an average age of 30 ± 5 years, participated in the study. The primary barriers to vaccination access identified were adverse reactions, false rumors, financial limitations, follow-up challenges, missed appointments, inaccessibility, vaccine shortages, poor cold chain management, inadequate staffing, negative past experiences, limited knowledge of vaccine importance, children's poor health, vaccine refusal, religious influences, and the unavailability of caregivers. Healthcare workers proposed several strategies to improve vaccination services, such as better communication with patients, community outreach and follow-up, ongoing education, enhancing cold chain management, increasing the workforce, and addressing cultural and religious factors. They highlighted the need to counter false rumors, provide financial support, and improve accessibility to vaccination services.

Conclusion: This study reveals the multifaceted barriers to vaccination access in Buea from the healthcare workers' perspectives. Overcoming these challenges requires a comprehensive approach, including community engagement, targeted interventions, and policy reforms. The findings emphasize the need for context-specific research to develop tailored strategies for enhancing vaccination coverage and safeguarding vulnerable populations from vaccine-preventable diseases in Buea.

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Introduction

Vaccination is a cornerstone of public health, playing a crucial role in preventing infectious diseases and improving community health. It is regarded as one of the most impactful public health measures, preventing millions of deaths annually. According to the World Health Organization (WHO), vaccination campaigns save an estimated 4 to 5 million lives each year by controlling diseases such as measles, polio, and diphtheria, which were once major causes of illness and death, particularly in children [1,2].

The global vaccination landscape reflects both progress and challenges. Recent reports indicate that approximately 1 in 5 children worldwide remain unvaccinated, revealing significant coverage gaps that can result in outbreaks of preventable diseases [1,3].

In Cameroon, vaccination coverage has faced several hurdles, particularly aggravated by the COVID-19 pandemic, which disrupted routine immunization services [4,5]. Despite these challenges, vaccination programs have led to a significant reduction in disease prevalence. Before the pandemic, Cameroon had made notable progress in increasing immunization rates; however, the resurgence of diseases like measles highlights the need for enhanced vaccine access and improved public confidence [1,2,6].

Vaccination is a vital component of the healthcare system, integrated at all levels. In Cameroon, the Expanded Program on Immunization (EPI) aims to provide comprehensive vaccination services to children and vulnerable groups, focusing on disease prevention and control [7,8].

Cameroon has developed a national vaccination schedule that includes vaccines for diseases like measles, polio, hepatitis B, and yellow fever. The government has launched several initiatives to improve vaccination coverage, including outreach campaigns and community engagement strategies. International partnerships, notably with the World Health Organization (WHO) and GAVI, the Vaccine Alliance, have been essential in supporting these vaccination efforts by providing funding, technical assistance, and vaccines. These collaborations help increase immunization rates and reduce the burden of vaccine-preventable diseases in the country [9].

In Buea, the healthcare system consists of both public and private facilities, but there are considerable disparities in service availability and quality [6]. Despite the presence of multiple health centers and hospitals, many residents face obstacles such as distance to healthcare facilities, lack of transportation, and inadequate staffing, which limit access to routine vaccinations [9].

Although existing studies have provided valuable insights into vaccination barriers in Cameroon, there are still significant gaps in research, particularly regarding the Buea region [4]. Most studies have focused on broader national or regional trends and rely on quantitative data from health systems, which may not capture the detailed experiences of healthcare workers or community members [10].

To address this gap, more qualitative research is needed to explore the perceptions, attitudes, and practices of healthcare workers and community members in Buea regarding vaccination. Understanding the local context and the unique challenges faced by this community is essential for creating targeted strategies to improve vaccination access. By identifying barriers to vaccination access and effective strategies for improvement, this study seeks to provide evidence-based recommendations for policymakers, healthcare administrators, and community stakeholders to enhance vaccination services and increase uptake in Buea.

Methods

Cameroon Healthcare System

Cameroon's healthcare system is organized into three levels: central, intermediate, and peripheral. The central level is managed by the Ministry of Public Health, which handles policy development, strategy formulation, and the coordination of health services. The intermediate level consists of 10 regional delegations that offer technical support to 189 health districts, which serve as the primary units for delivering healthcare. Each district is overseen by a District Medical Officer who is responsible for executing health programs, including vaccination efforts [7,11].

Study Site and Design

Buea, the capital of the South West Region of Cameroon, provides a distinctive environment for studying vaccination access, shaped by various demographic and socio-economic factors. The population is diverse, with different levels of education, income, and cultural beliefs, all of which can influence healthcare access and attitudes toward vaccination. Socio-economic challenges, such as poverty and limited access to healthcare facilities, further complicate the vaccination landscape in Buea.

This study utilized a qualitative research design with in-depth interviews guided by the WHO Behavioural and Social Drivers (BeSD) tool. The WHO Behavioral and Social Determinants (WHO BeSD) of vaccination tool is a standardized framework designed to identify and evaluate the social and behavioral factors, beyond individual health, that influence healthcare interventions. This allows for evidence-based planning to address the social determinants affecting health. The BeSD tool is based on a framework that has 4 domains of behavioural and social drivers of vaccination; Thinking and feeling, Social processes, Motivation, and Practical issues [12]. The study was conducted in the city of, Cameroon. Buea, being the regional capital, has a diverse population and complex healthcare needs, with multiple facilities providing vaccination services.

Purposive sampling in qualitative research which is a non-probability sampling technique was used by deliberately selecting participants based on the following characteristics: Healthcare workers with at least one year of experience in vaccination, including nurses and midwives from private, faith-based, and government health facilities. They were recruited from the following facilities:

- Mount Mary Hospital Buea,
- Buea Regional Hospital,
- Molyko Integrated Health Center,
- Buea Town Integrated Health Center,
- Bokwango Integrated Health Center,
- Buea Road Integrated Health Center.

These facilities were chosen for their ability to offer vaccination services, allowing a thorough examination of vaccination barriers and healthcare provider perspectives within the city of Buea.

Data Collection and Sampling

Data collection involved conducting in-depth interviews with healthcare workers involved in vaccination services at the selected facilities in the city of Buea. Using the WHO BeSD tool, each interview lasted between 15 and 25 minutes and aimed to explore the participants' perspectives. Eligible participants included nurses and midwives with at least one year of vaccination experience, who were informed about the study and provided consent to participate.

Interviews took place in quiet, designated spaces within the healthcare facilities to ensure privacy and minimize interruptions. A portable microphone was used to ensure clear audio recording. The interview guide was structured to maintain consistency across interviews while allowing for flexibility in exploring emerging themes. All interviews were audio-recorded for accurate analysis.

Key Operational Definitions

- **Vaccination Access:** The ability of individuals to obtain immunizations, which is influenced by factors such as service availability and affordability.
- **Healthcare Workers:** Professionals, including nurses and midwives, who are responsible for delivering vaccination services.
- **Barriers:** Challenges that prevent individuals from receiving routine vaccinations, which can be logistical, sociocultural, or systemic.
- **Immunization Strategies:** Approaches aimed at improving vaccination uptake, such as educational programs and policy reforms.
- **Buea, Cameroon:** The geographic location of the study, referring to the urban health district and city in the South West Region of Cameroon.

Data Management and Analysis

The interviews were transcribed verbatim, and a coding framework was developed based on the interview guide. This framework included child and sub-child codes to organize the themes identified during the thematic analysis. A cloud pack diagram was used to visualize the themes, with the size of each theme reflecting its frequency and significance.

Data management and analysis were carried out using Dedoose software (version 9.2.006.exe), which facilitated efficient coding, theme identification, and visualization. This systematic process ensured that the analysis produced meaningful and actionable insights, contributing to the study's objectives.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Review Board (IRB) at the Faculty of Health Sciences, University of Buea, ref: 2024/2359-01/UB/SG/IRB/FHS of 14 February 2024. Administrative approval was also secured from the Regional Delegation of Public Health for the South West Region of Cameroon. Permission was granted by all the health facilities where interviews took place, ensuring adherence to institutional policies and protocols.

Results

Participants were interviewed at several healthcare facilities, including Mount Mary Hospital (a faith-based institution), government-run facilities, and a private facility (Solidarity Hospital Molyko). Most interviews (6) took place at government facilities, 5 at Solidarity Hospital Molyko, and 3 at Mount Mary Hospital.

All 16 participants were female healthcare professionals with an average age of 30 ± 5 years, and seven were married. Their educational backgrounds ranged from Higher National Diploma (HND) to Bachelor of Science (BSc) in Nursing and Midwifery. Among them, seven were nurses, seven were midwives, one was a nurse assistant, and one was a nurse/midwife. Fifteen interviews were conducted in English, and one was conducted in French.

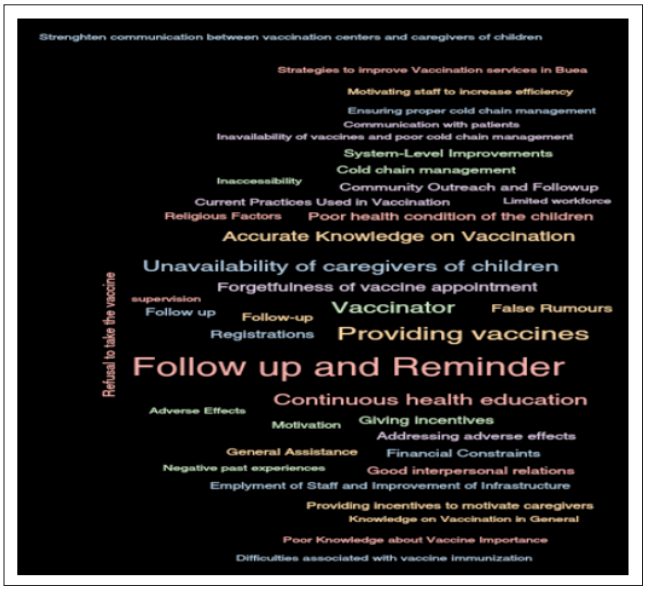

Figure 1: Cloud Diagram of Themes

Current Practices in Delivering Vaccination Services

Thematic analysis revealed several key practices currently used in delivering vaccination services, including managing adverse effects, ensuring effective cold chain management, conducting follow-up and sending reminders, offering incentives, fostering positive interpersonal relationships, providing health education alongside vaccines, and recording attendance and other health-related data (Figure 1).

Challenges in Providing and Accessing Vaccination Services

Thematic analysis identified several challenges related to both the delivery and accessibility of vaccination services. These include concerns about adverse effects, false rumors, financial limitations, issues with follow-up, missed appointments, inaccessibility, vaccine shortages, poor cold chain management, insufficient healthcare workforce, negative past experiences, lack of knowledge about the importance of vaccines, poor health of children, vaccine refusal, religious influences, and the unavailability of caregivers (Figure 1).

Adverse Effects

In Buea, some parents are worried about the potential adverse effects of vaccines. They fear that vaccines could cause swelling in their children, and some have heard of cases, such as one in Yaoundé, where a child allegedly died following the yellow fever vaccination.

"*Some would say it will make their child's like to get swollen. Like two months ago one child died in Yaounde because of yellow fever vaccine. (Trans5_IDI_Bokwango_Government_Female)*".

False Rumors

Healthcare providers face difficulties in providing vaccination services due to the spread of false rumors and misinformation. They recall cases where parents declined vaccinations based

on irrational fears, such as the belief that vaccines can lead to paralysis. For instance, one parent refused to vaccinate their child, citing a rumor that a child had been paralyzed after receiving a vaccine.

"*Another experience was when a parent, a husband boldly refused that his child cannot be vaccinated because we carry our investigations of peoples' children and some would say this person's child was vaccinated and then the child was paralyzed and so we added diseases to the child. (Trans11_IDI_Molyko_Private_Female)*".

Financial Constraints

Financial limitations were identified as a major obstacle to accessing vaccination services. Healthcare providers shared that some parents express concerns about not having enough money for transportation to vaccination centers and prefer to visit hospitals that are closer to their homes.

"*With respect to them, some usually complain that they don't have transport to come here and they prefer to go hospitals close to them… I'll just speak in their normal parlances. (Trans3_IDI_Bokwango_Government_Female)".*

Limited Workforce and Its Impact on Follow-up

The findings reveal that healthcare providers at Molyko Private in Buea consider the limited workforce a major challenge in delivering and accessing vaccination services. They note that the high number of children requiring vaccinations makes it difficult to manage the workload efficiently, emphasizing the need for more staff or additional resources to enhance vaccination services in Buea.

"*The vaccination part because the children are many. (Trans12_IDI_Molyko_Private_Female)".*

The shortage of staff also hampers efforts to follow up with caregivers to ensure the completion of their children's vaccinations. Healthcare providers face a high dropout rate and find it challenging to encourage parents to finish the vaccination schedule. Furthermore, they note that it is often difficult to leave the private institution to follow up with parents, as time constraints and understaffing limit their ability to do so.

"*The most difficult part is to convince them to come back. Because we have what we call dropouts, to convince them and sometimes… I don't know how to put that last part… I don't want to say it's finance because to get there sometimes is not easy too with the limited staff. (Trans10_IDI_Molyko_Private_Female)".*

Another challenge to follow-up is the unavailability of caregivers. Some parents frequently miss vaccination appointments due to travel or other personal commitments, resulting in delays in the vaccination schedule.

"*one reason that I have been getting is that, most of them they will say… when this person comes that has skipped her appointments for like two months, they would say I traveled to the village. (Trans4_IDI_Bokwango_Government_Female)".*

Forgetfulness of Vaccine Appointments

Parents frequently forget or miss their children's vaccination appointments for various reasons, such as going to the market, not having someone to look after their other children, or the child being unwell.

"*I forgot, I went to the market, nobody was in the house to stay with the other children or the child was sick. Something like that. (Trans6_IDI_Molyko_Government_Female)".*

Inaccessibility

Limited access to healthcare facilities can prevent children from receiving vaccinations. Healthcare providers recalled an instance where a child born in a remote area was not vaccinated, but later received the vaccine when the family relocated to a town with better healthcare services.

"*We had a child that was delivered in a bush, I think it's because they did not have the opportunity to be vaccinated but then they got to town the child was vaccinated. (Trans11_IDI_Molyko_Private_Female)".*

Unavailability of Vaccines and Poor Cold Chain Management

Healthcare workers also highlighted the unavailability of vaccines and inadequate cold chain management as major obstacles to providing and accessing vaccination services. They mentioned that frequent power outages often disrupt the cold chain, leading to vaccine spoilage and necessitating their disposal.

"*Well, the most difficult is the cold chain, how to preserve the vaccines due to ENEO, the light issues. Most times, some vaccines even get bad and we are forced to discard them because we can't keep them due to the preservation methods. I think aside from that, there's no other challenge. (Trans13_IDI_Molyko_Private_Female)".*

Negative Past Experiences

Negative past experiences with vaccination can also discourage parents from seeking vaccination services. For example, a recent incident in Tiko, a town about 20 minutes from Buea, involved a child reportedly becoming paralyzed after receiving the polio vaccine, fueling concerns and skepticism among some members of the community.

"*Ehhh vaccination as a whole, in quotes to some people it sounds challenging to them because of some challenges some other people have had… like if you look behind. In the last campaign that just past in Tiko there was a child who was walking and the poliomyelitis vaccine was administered and the child has gone down and the child is not more walking. So, it causes a lot of raising of eyebrows to people. (Trans11_IDI_Molyko_Private_Female)".*

Lack of Awareness about the Importance of Vaccines

One challenge highlighted was the difficulty in convincing uneducated mothers about the value of vaccination. Some mothers, especially those who did not attend school, fail to recognize the importance of vaccines, often citing that their own mothers never received vaccines and remained healthy. Healthcare providers find this attitude disheartening, as it obstructs their efforts to promote vaccination services.

" *for me it is difficult especially when you are dealing with the women that didn't go to school because some of them, they don't see the importance of the vaccine as like as they rightly say our mothers didn't give us any vaccine and today, we are strong. So that's what some of them usually say of which is somehow really discouraging but we just try to keep up. (Trans2_IDI_Mount Mary Hospital Faith_ Based_Female)".*

Children's Poor Health Status

The poor health condition of a child can sometimes prevent parents from seeking vaccination for their child. Healthcare providers noted that if a child has recently been ill, they typically refrain from administering vaccines until the child's condition stabilizes. This is because vaccines could potentially worsen existing health issues, such as fever, and providers prioritize the child's overall health before proceeding with vaccination.

"*the most important reason we take into consideration is when maybe they were sick. Sick babies we don't give them vaccines until when they are stable because vaccines make them sick… some get fever and…So, those are some of the reasons that they give. (Trans9_IDI_Buea Road_Buea Road_Female)*".

Vaccine Refusal

Some parents firmly refuse to vaccinate their children, regardless of the information or advice provided. Despite counseling, these parents still choose not to vaccinate their child, and healthcare providers find it difficult to change their stance in such situations.

"*the hardest part is when… when somebody just refuse that he is not taking the vaccine no matter the counseling, if not there is no other thing again. (Trans2_IDI_Mount Mary Hospital_Faith Based_Female)".*

Religious Factors

Religious beliefs also pose challenges to accessing vaccination services. Some churches have been reported to discourage their members from receiving vaccines, citing religious views that oppose vaccination.

"*Some churches do not accept vaccines; their faith does not accept vaccines. (Trans6_IDI_Molyko_Government_Female)".*

Strategies to Enhance Vaccination Services in Buea

Based on the thematic analysis of the qualitative data, the following strategies were identified to improve vaccination services in Buea: effective communication with patients, community outreach and follow-up, recruitment of additional staff and infrastructure improvements, ongoing health education, and the motivation of both staff and caregivers.

Communication with Patients

Effective communication with patients was emphasized as a key strategy to improve access to vaccination services. Healthcare providers recognized that mothers frequently express concerns about long waiting times, so they make sure everything is prepared a day before the scheduled appointments to minimize delays. To help prevent missed appointments, they also inform mothers in advance. Additionally, providers offer motivational gifts at specific stages of the vaccination process to encourage consistent participation. Community agents are also used to raise awareness and follow up with hesitant mothers, reminding them of their vaccination schedules.

"*we also make sure that we inform them ahead so they don't miss their rendezvous. For the community, normally we send emmm… community agents to always sensitize and follow up, especially those cases that are reluctant, we place community agents to make sure that they go and remind them… follow them up so that they don't miss their schedules. (Trans9_IDI_Buea Road_Buea Road_Female)".*

Community Outreach and Follow-up

Community outreach and regular follow-ups were highlighted as essential strategies to enhance access to vaccination services. It was suggested that outreach sessions be organized within the community to educate parents on the importance of each vaccine and the necessity of vaccinating their children. Healthcare providers also stressed the value of consistent follow-ups, such as phone calls, to remind mothers of their upcoming vaccination appointments.

"*I think if I had the chance I would go for outreach, in the community like as a group. Talk to them about the importance of each and every vaccine, why their children would need to take the vaccines. Also, like follow ups, not like one on one follow up but like consistent follow-ups, but we are already doing that because if we don't see a woman on her appointed date, we give her a call. (Trans4_IDI_Bokwango_Government_Female)".*

Employment of Staff and Improvement of Infrastructure

Enhancing infrastructure and hiring additional staff were identified as key strategies to increase vaccination coverage. Healthcare providers pointed out the difficulties of working in cramped spaces with a high volume of patients, often handling 110-120 children for vaccination. To overcome this, they suggested expanding the facilities to create more space, allowing for better management of patient flow and improved service delivery. Furthermore, they emphasized the need for more personnel to support the vaccination efforts.

"*the environment that we are working inside…. In short, that we're working with is small because we are having population here, at time we can have 110, 120 children here just for vaccination. So, if I have to improve I would first of all start by changing the environment so they may have more space. (Trans1_IDI_Mount Mary Hospital_Faith Based_Female)*".

Continuous Health Education

The importance of ongoing health education was highlighted as a key strategy to increase vaccination rates. Community sensitization efforts should include activities such as health talks at healthcare facilities, where individuals can be educated about the significance of vaccination and immunization. This approach is especially important as some people may lack a clear understanding of the benefits and concepts of vaccination.

"*There's what we call sensitization. So, sensitizing the community… Educating, for me through any method possible on the importance of vaccination and immunization and to explain because there are some people who do not know what vaccination and immunization is. (Trans10_IDI_Molyko_Private_Female)".*

Motivation of Caregivers

Encouraging caregivers through motivation was identified as an important strategy to increase vaccination participation. It was suggested that caregivers should be acknowledged and rewarded for ensuring their children receive full vaccinations. Possible incentives could include providing vaccination certificates, offering food or household items, or giving verbal recognition for the child's vaccination progress.

"*Everybody likes to be motivated. So, if we can put a strategy on…like what we were doing in order facilities like when a baby succeeds to get from first vaccine to 9 months. we would give a vaccination certificate that motivates and we would have sharing*

of maybe biscuits or we give the savons to maybe encourage them or congratulate them from going from BCG To completion. (Trans6_IDI_Molyko_Government_Female)".

Motivating Staff to Enhance Efficiency

Healthcare providers stressed the need to motivate staff to improve the efficiency of vaccination services. They recommended ongoing sensitization efforts for both the community and healthcare workers to ensure a shared understanding of the importance of vaccines. Furthermore, they emphasized that motivating healthcare staff is essential, as everyone requires encouragement to perform at their highest potential.

Discussion

The study conducted in Buea, Cameroon, identified several interconnected barriers to vaccination access that impede effective immunization efforts.

Concerns about vaccine side effects and miscommunication play a significant role in shaping parental decisions regarding vaccinations. Healthcare providers reported cases where parents refused to vaccinate their children due to fears of severe adverse reactions [5]. Among the most prevalent fears were rumors suggesting that vaccines could cause serious conditions like paralysis. These fears were often fueled by misinformation, such as social media rumors or anecdotal stories, which lacked scientific validation [4]. This reflects a wider issue of vaccine hesitancy, where safety concerns are a primary reason parents opt against vaccination. Existing research supports this conclusion, showing that vaccine safety concerns drive hesitancy, particularly in communities with low health literacy [13,14]. In such communities, where people may have limited access to reliable health information or struggle to grasp complex medical concepts, misinformation can easily spread, emphasizing the importance of clear and accurate communication from healthcare professionals to address these concerns and improve vaccine acceptance [15-18].

The study also revealed financial barriers, particularly the high cost of transportation to vaccination centers, which discourages parents from seeking vaccination services for their children. For many families, the financial burden of traveling long distances to access vaccination facilities can be prohibitive, leading them to delay or forgo vaccinations [19]. This issue is most pronounced in rural or remote areas, where healthcare facilities are sparse, and parents must spend considerable time and money to reach vaccination centers [20]. These financial constraints were identified as a key deterrent to vaccination uptake, consistent with findings from other studies that emphasize the role of economic factors in determining vaccination rates, particularly in low-resource settings [21].

Healthcare workers in the study also pointed to poor cold chain management and vaccine shortages as significant obstacles to effective vaccination programs [22]. Cold chain management involves ensuring that vaccines are stored and transported at the appropriate temperatures to maintain their potency. Failures in cold storage, such as power outages, malfunctioning refrigerators, or transportation delays, can compromise the vaccines' safety and effectiveness, leaving children vulnerable to disease and undermining public health efforts [23,24].

Socio-cultural factors, such as religious beliefs that discourage vaccination, were also identified as barriers to vaccination access. This mirrors findings from other regions where cultural attitudes significantly impact vaccination acceptance [25]. Furthermore, negative past experiences with vaccination, such as reports of adverse events, contribute to parental skepticism. Studies have documented how such past experiences can lead to long-term mistrust in vaccination programs [26].

The study also noted that some parents, especially those with lower educational levels, lacked understanding of the importance of vaccines. This aligns with research indicating that higher education levels correlate with better health outcomes and higher vaccination rates [27].

The barriers identified in this study reflect a complex mix of individual, economic, and systemic factors, consistent with broader trends in vaccination research. Addressing these challenges requires comprehensive strategies involving community engagement, health education, and improvements in logistics to increase vaccination coverage and protect vulnerable populations from preventable diseases [28].

Several strategies to improve vaccination access and uptake were identified in the study. These strategies include enhanced communication with patients, community outreach and follow-up, employing additional staff, improving infrastructure, continuous health education, and motivating both staff and caregivers. These suggestions align with recommendations from Jiang and colleagues in a related study [29].

Effective communication was highlighted as a crucial strategy to address concerns and increase vaccine adherence. This could involve informing mothers about vaccination schedules ahead of time and addressing issues like long waiting times to improve the patient experience [30,31]. This proactive approach is supported by existing research, which underscores the importance of clear communication in reducing vaccine hesitancy and improving public trust in vaccination programs. This also aligns with findings from the city of Buea and Tiko health district, where effective communication and patient engagement were key to successful digital health interventions [32].

Community outreach and follow-up were emphasized as important strategies for engaging families and increasing participation in vaccination programs. By reminding families of vaccination appointments, these strategies help foster trust and encourage parents to prioritize immunization for their children [7,30,33].

Hiring more staff and improving healthcare infrastructure are also important interventions to boost vaccination rates. Other studies have shown that the availability of healthcare personnel is directly linked to better vaccination coverage, particularly in underserved areas [8,21,34,35].

The ongoing education of healthcare providers and the community was emphasized as crucial. Training healthcare professionals to address vaccine-related concerns enables them to more effectively inform and reassure parents. Previous studies have shown that health education programs can greatly enhance knowledge and acceptance of vaccination [7,8,36].

In environments where misinformation or vaccine hesitancy is common, incentives can help increase engagement with healthcare workers and build trust in the healthcare system. Offering rewards can help reach vulnerable groups who may be doubtful about vaccination, providing them with a tangible incentive for participating in immunization programs. While

incentives alone are not a complete solution, research shows that when used thoughtfully alongside other strategies like health education and outreach, they can significantly boost vaccination rates. By addressing barriers to vaccination through both practical and motivational approaches, these programs can have a lasting positive effect on public health in resource-limited settings [25].

The strategies highlighted in this study align with wider patterns found in vaccination research. For example, the role of communication has been repeatedly stressed in studies addressing vaccine hesitancy, where misinformation and a lack of understanding are major obstacles to increasing vaccination rates [5,15,37].

Additionally, community engagement strategies have been shown to be effective in various settings, as demonstrated by programs in sub-Saharan Africa that successfully boosted immunization rates through local participation [33]. The importance of enhancing infrastructure and staffing is another recurring theme in vaccination research, with strengthening health systems identified as vital for achieving higher vaccination coverage [21].

Conclusion

To decrease the rates of zero-dose and under-immunization, the study outlined several essential strategies for implementation: improving communication with patients, strengthening community outreach and follow-up, actively engaging with communities, enhancing staff employment and infrastructure, ensuring continuous health education, and providing motivation for healthcare workers and caregivers.

Limitations

A limitation of this study on barriers to routine vaccination access in Buea, Cameroon, is its reliance on qualitative data exclusively from healthcare workers, which may introduce bias since their views may differ from those of parents or caregivers. The small sample size of sixteen female healthcare providers restricts the generalizability of the findings, as it excludes the perspectives of male healthcare workers and caregivers. The study's geographic focus may not fully represent broader vaccination challenges across Cameroon. Social desirability bias could also result in underreporting of negative factors. Furthermore, the methodology may not capture the evolving challenges in vaccination access, particularly during public health emergencies like COVID-19. Additional research involving diverse perspectives and larger sample sizes is necessary to assess the effectiveness of community-based interventions that aim to improve communication and outreach to caregivers about the importance of vaccination, engage trusted local leaders to promote vaccination, and enhance access to immunization services in remote areas.

Author Contributions

Conceptualization, JND, NT; methodology, JND, FNN; data collection, FNN, SEM, SDG; formal analysis, NT, AAN, GEM, IA; writing—original draft preparation, JND, FNN, SEM, IA; writing—review and editing, AAN, GEM, EMD, MJMEA; supervision, JND, NT, SDG, EMD, MJMEA. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Ethical approval was granted by the institutional review board Faculty of Health Sciences, University of Buea Application No: 2024/2359-01/UB/SG/IRB/FHS.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The raw data used for this research are available from the Corresponding author upon request.

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Conflicts of Interest

The authors declare no conflict of interest.

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