Texila International Journal of Public Health
ISSN: 2520-3134
DOI: 10.21522/TIJPH.2013.12.04.Art074

Drivers, Reasons, and Experiences of Default and Missed Measles Vaccination in Ethiopia: A Qualitative Study

Gulilat Gezahegn Wodajo[1,2]*, Tezera Moshago Berheto[3], Haimanot Kifle Telila[4], Yohannes Kebede Lemu[5]

[1]*Immunization Service Desk, Federal Ministry of Health, Addis Ababa, Ethiopia*
[2]*Department of Public Health, Texila American University, Georgetown, Guyana*
[3]*National Data Management Center, Ethiopian Public Health Institute, Addis Ababa, Ethiopia*
[4]*Department of Obstetrics and Gynecology, Zewditu Memorial Hospital, Addis Ababa, Ethiopia*
[5]*Department of Health, Behavior and Society, Jimma University, Jimma, Ethiopia*

Abstract

Despite the availability of a safe and free vaccine, measles first and second-dose vaccination coverage is still low in Ethiopia. Studies that examine caregivers' reasons for not receiving the measles vaccination in Ethiopia are scarce. Hence, this qualitative study aimed to uncover drivers, reasons, and experiences of default and missed measles vaccination from a caregiver perspective. A case study was conducted from December 2023 to May 2024 in the east Gurage zone of central Ethiopia. Data were collected through sixteen in-depth interviews with mothers who had measles vaccine-missed children and six focus group discussions with women aged 15-49 with children under five years old and mothers who were over 50. Caregivers were asked to answer open-ended questions regarding reasons for missing the measles vaccination. Data were coded, categorized, and analyzed manually by using an inductive thematic analysis approach. The four fundamental trustworthiness metrics for qualitative research were considered. Finally, we presented the themes and sub-themes supporting them with representative quotations. Geographic barriers, transportation costs, inconvenience of vaccination dates, lack of information when to return, mistrust, rumours, poor attendance in pregnant women's conferences, lack of autonomy to travel, workload, economic dependency, poor male involvement, mother-in-laws' influence, rounds of vaccination and administration routes, and adverse events following immunization were identified as reasons for missing measles vaccination. These reasons were found at each stage in the immunization journey. Hence, applying a human-centred design with tailored intervention might be important to address barriers at each stage.

Keywords: *Defaulters, Measles Vaccination, Missed Vaccination.*

Introduction

Measles is an extremely contagious, airborne disease that can cause serious health problems or even death [1]. Despite the availability of a safe and affordable vaccine, a projected 136,000 measles deaths occurred worldwide in 2022, with children under the age of five who were either unvaccinated or under-vaccinated [2]. When administered on time, the measles vaccine provides lasting protection against the potentially fatal illness after two doses. To achieve measles elimination, countries must achieve and sustain 95% immunization coverage with two doses [3]. Zero-dose children, or those who have not received any vaccinations, accounted for 14.5 million children worldwide in 2023. Coverage of the first and second doses of the measles vaccination was 83% and 74%, respectively [4].

Received: 18.09.2024 ***Accepted: 05.11.2024*** ***Published on: 27.12.2024***
****Corresponding Author: gimmylv@gmail.com***

Measles cases and outbreaks are common in Ethiopia. There were 16,814 laboratory-confirmed cases of measles and 182 deaths between August 12, 2021, and May 1, 2023, with a 1.1% case fatality ratio (CFR). Only 36% of the reported cases of measles had received one dose or more of the measles-containing vaccine (MCV) [5]. The 2019 Ethiopian demographic health survey also reveals that measles measles-containing vaccine first dose (MCV1) and measles-containing vaccine second dose (MCV2) coverage were 59% and 9%, respectively [6]. According to WHO/UNICEF Estimates of National Immunization Coverage (WUENIC), MCV1 and MCV2 coverage in 2023 was projected to be 61% and 53%, respectively [7].

The factors influencing the measles vaccination in Ethiopia are not well studied. However, some studies revealed that traditional beliefs, caretakers' behaviour, insufficient awareness, low parental trust, family characteristics, poor interpersonal communication (IPC), and the immunization service system are barriers to measles vaccination [8 – 11]. Incomplete vaccination is predicted by several factors, including not receiving antenatal care, giving birth at home, not seeing a health worker within a year, and taking longer than an hour to get to the vaccination site [12]. The majority of research conducted in Ethiopia is quantitative, and they did not examine caregivers' experiences or reasons for not receiving the measles vaccination [9,13 – 15].

The obstacles caregivers have while attempting to vaccinate their children are brought to light by the application of human-centred design (HCD) and intersectional approaches, which also emphasize how vaccination and primary health care (PHC) services are not designed with their needs in mind [16]. The participation of caretakers in qualitative research can strengthen the legitimacy of their unadulterated viewpoints [17]. This qualitative research incorporates caregivers' intimate perspectives, intricate assessments of many viewpoints, and particular situations from various places that influence caregiver experiences with measles vaccinations. Hence, the purpose of this study was to uncover drivers, reasons, and experiences of default and missed measles vaccination from a caregiver perspective.

Material and Methods

Study Design

The study employed a case study research design to comprehensively investigate the drivers, reasons, and experiences of default and missed measles vaccinations.

Study Setting

The study was conducted in the east Gurage zone of central Ethiopia from December 2023 to May 2024. Two districts (sodo and South Sodo) and six kebeles were selected based on the high number of unvaccinated children. East Gurage Zone is located in the central part of the country and 130 km away from Addis Ababa, the capital city of Ethiopia. The zone had two hospitals, 71 health centres, 103 health posts, and 33 private clinics. Based on the 2007 census population projection, the zone had a total population of 502,404 and 16,000 surviving infants [18].

Participants and Sampling

A total of 16 mothers/caregivers of children aged 12 - 23 months who missed the first or second dose of measles vaccination were purposively selected in low-performing kebeles for in-depth interviews. Moreover, 72 women were selected for six focus group discussions in those low-performing kebeles. Focus Group Discussion (FGD) participants included women aged 15 - 49 with children under five years old and mothers who were over 50. Based on the optimal saturation point of participants, the study's sample size was established.

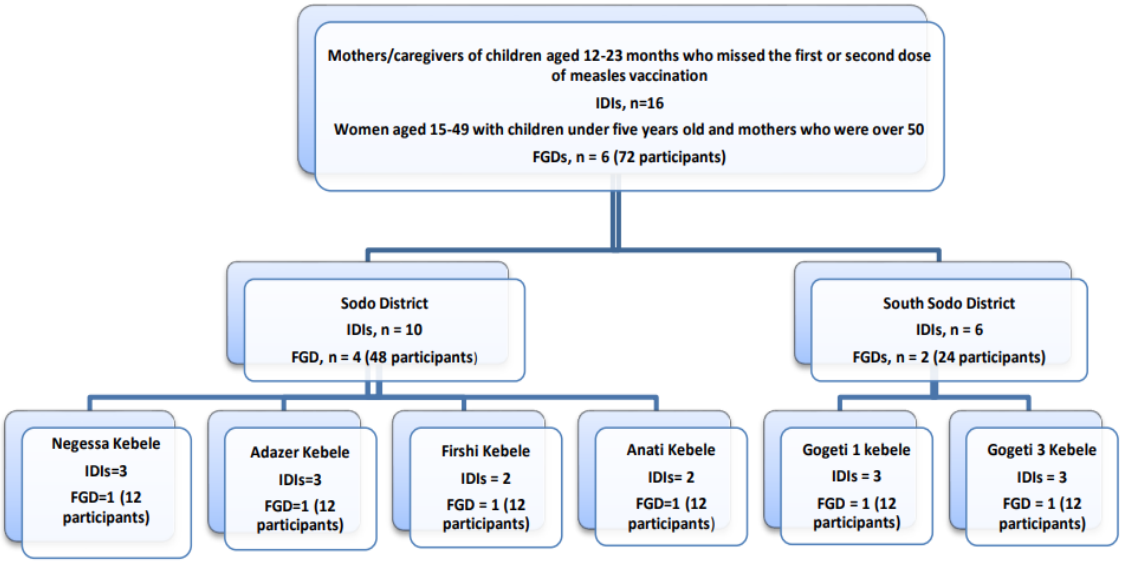

Figure 1. Schematic Illustration of the Sampling Procedure of the Study Participants in Sodo and South Sodo Districts, December 2023

Measurement

The measles-containing vaccine (MCV) is given in two doses; the first dose is given at nine months, and the second dose is given at 15 months of age [5]. Mothers or caregivers of children who took the pentavalent vaccine at 6 or 14 weeks and missed the first dose of measles vaccination at nine months or who took the first dose of measles vaccine at nine months but didn't complete the second dose at 15 months were interviewed. Those selected mothers/caregivers were asked to answer open-ended questions through in-depth interviews regarding the reasons why their children defaulted or missed the measles vaccination. Furthermore, they were also asked about their experience during the previous vaccination and drivers for completing the measles vaccination. Whereas, women aged 15 - 49 who had children under the age of five and women over 50 years were asked about their experiences, perceived drivers, and reasons for defaulting or missing the measles vaccination through FGD.

Data Collection Methods

The English version of the in-depth interview and FGD guide was developed by reviewing different literature [19, 20], translated into the local language (Amharic), and checked by bilingual experts to ensure the consistency and accuracy of the translation. The guide was pretested among eligible women who were residing in a similar setting outside of the study area. Based on the input from the pretest, questions and translations were improved before data collection.

The data were collected by two public health professionals who have experience in qualitative data collection and are familiar with the sociocultural conditions of the community. A two-day training was provided with an emphasis on the guide's content, data collection methods, and the ethical conduct of human research. The principal investigator closely supervised the data collection processes and checked the completeness daily. The immunization history was confirmed by checking the immunization card and the verbal report of the mother/caregiver. The data were collected using pretested interview guides through face-to-face interviews with mothers at their homes and FGD in their village. The interview time ranged from 40 to 90 minutes based on the saturation of the participants' ideas. An interview guide, note-taking, and tape recorder were employed to collect the data.

Data Analysis

An inductive thematic analysis approach was employed to analyze the data. The interviewed data were first transcribed in the Amharic language, in which the interviews were conducted. Next, the data were translated and transcribed into English. We read and re-read the audio-taped transcripts to capture an overview of the data. Before the coding process starting, two investigators, one with a PhD degree and the other with a master's level, independently went over the transcripts to pinpoint important themes and create a code structure. Then, a final edition of the code was developed, and the categories and themes were constructed. We engaged in further categorization and data reduction to sub-themes. Data were coded, categorized, and analyzed manually by using an inductive thematic analysis approach. Finally, the results were presented using the major themes, sub-themes, and supportive quotations.

Trustworthiness

The rigour of this research was ensured by carefully considering multiple criteria. To begin with, enough information from different communities was acquired to enable the production of noteworthy results. Secondly, there was enough time spent in the field to produce accurate results. Third, adhered to a rigorous procedure when conducting interviews, making field notes, and analyzing data.

Throughout data collection and analysis, consideration was given to the four fundamental qualitative research trustworthiness measures [21]. The first is credibility; to achieve this, data were collected by experienced qualitative data collectors; data saturation was taken into account; the principal investigator supervised all the data collection processes; and data were transcribed and translated by senior experts. Furthermore, detailed descriptions of drivers, reasons, and experiences of default or missed measles vaccination and supportive quotations were provided. Aside from that, two data collection techniques were employed to produce a more intricate, diversified, and credible image of the outcome. During data collection, translation, and transcription, peer debriefing and audit trials are conducted as part of the second criterion, dependability. The third is transferability, which results from the use of numerous data triangulations and the fact that the data were collected in an area with limited resources. Conformability, the fourth criterion, makes sure that the interpretation and analysis of the data are only based on the data and not the preferences or viewpoints of the researcher.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board, Ethiopian Public Health Institute (IRB-EPHI). A permission letter was sought from Sodo and South Sodo district health offices. Similarly, after explaining the purpose of the study, written informed consent was obtained from each study participant. The study subjects' right to refuse was respected. Identification of study participants by name was avoided to assure the confidentiality of the information obtained.

Results

As indicated in Table 1, the age of the respondent mothers ranged from 19 to 55 years, whereas the age of their defaulter children was 12 to 23 months. Of the total 88 mothers who participated, 81 (92%) were married, and 73 (83%) couldn't read and write. All participant mothers/caregivers were from rural communities. All sixteen mothers with measles vaccination defaulted or missed children were not able to cover transportation costs for RI sessions. A total of 72 mothers participated in the focus group discussion.

Table 1. Scio-Demographic Characteristics of the Study Participants in Sodo and South Sodo Districts, December 2023

Variables		**In-depth interviews (mothers/caregivers)**		**FGD (mothers/caregivers)**	
		#	%	#	%
Age of children	12-23 months	16	100	NA	NA
Age of mothers	<20	0	0	2	3
	20-29	4	25	6	8
	30-39	9	56	52	72
	40-49	3	19	9	13
	≥50	0	0	3	4
	Total	16	100	72	100
Marital status	Married	14	88	67	93
	Divorced	1	6	2	3
	Widow	1	6	3	4
	Single	0	0	0	0
	Total	16	100	72	100
Educational status	No formal education	15	94	58	81
	Primary	1	6	13	18
	Secondary	0	0	1	1
	University	0	0	0	0
	Total	16	100	72	100
Residence	Urban	0	0	0	0
	Rural	16	100	72	100
	Total	16	100	72	100
Able to pay for transportation during RI sessions	Yes	0	0	NA	NA
	No	16	100	NA	NA
	Total	16	100	72	100

By conducting sixteen in-depth interviews and six focus group discussions, we identified four themes and sixteen sub-themes for drivers, reasons, and experiences of default and missed measles vaccination.

Theme: Lack of Knowledge and Information, Mistrust, and Rumors

This theme embraces a lack of knowledge and awareness, a lack of information on when to return, a lack of information on Adverse Events Following Immunization (AEFI), a lack of trust in vaccines and providers, rumours, and poor attendance at women's development team meetings and pregnant women's conferences.

Lack of Knowledge

In this study, lack of knowledge was found to be one of the factors to affect measles vaccination. Most mothers whose children were not vaccinated or defaulted had no formal education. Some of them perceived that immunizations are not necessary for children to grow or become healthy. A 55–year-old FGD participant in a rural setting said:

"Immunization was not available when I was a child, and I didn't receive any vaccines. However, still, I'm alive and healthy. Why do we bother our children with several vaccines with unknown outcomes?" Another FGD participant said:

"God blessed me with my child and protected him from disease and injury."

Lack of Information When to Return

Lack of information about the national immunization schedule was also identified as one of the factors. Among the main reasons for defaulting on the service was a lack of information about the next appointment. A 31-year-old mother whose child missed the second measles dose said:

"I believed my child had received all of the recommended vaccinations. I was unaware that my child needed to have a second dose of the measles vaccination at 15 months, even though my child had already had the first dose at 9 months."

Our analysis also revealed that mothers who don't have formal education to read the appointment date on the immunization card missed the measles vaccination. It seems healthcare providers didn't explain when mothers should return for the next immunization.

Lack of Information on AEFI

Children sometimes receive three injections at a time, particularly at six and fourteen weeks. Mothers consider the pain following those injections to be a serious health problem. This results in mothers whining. A 39-year-old defaulter's mother said:

"During my last visit to the immunization session, the HEW gave my child three injections and two orally administered vaccines, which caused my child to become ill at night. Ultimately, my husband and I decided to skip the subsequent round—the measles vaccination—instead of returning." A 43-year-old woman at FGD said:

"I took my daughter to the health centre, and they gave her the first vaccination in her upper arm. However, my child's arm became flaccid for some time. Then I made the decision not to return for vaccinations after that experience."

Also, some mothers miss their child's vaccination when the child becomes ill during the vaccination window; they usually choose not to bring their child to the health post for vaccination. They anticipate that the health status of the child may worsen.

Lack of Trust in Vaccines and Providers

In this study, a lack of trust in vaccines and providers was identified as a reason for missing or dropping the measles vaccination. Some mothers even assert that giving their children too many vaccinations could have long-term negative effects on their health. A 45-year-old FGD participant said:

"The vaccine might be administered to harm our children or render them infertile to reduce the country's population."

Rumours

There were negative rumours about routine immunization that can cause serious problems for the effective delivery of immunization services. Surprisingly, a 39-year-old mother with an unvaccinated child said:

"Children who receive vaccinations act against our culture, treat their parents disrespectfully and begin having sex at a young age. Therefore, I refuse to vaccinate my children."

Poor Attendance in Women's Development Team Meetings and Pregnant Women's Conferences

In this study, community structures like the women's development team and pregnant women's conferences were identified as a good opportunity to mobilize mothers for immunization services. At least once a month, each village holds a community conversation session during which they discuss the importance of immunization. Mothers who are

not engaged in the women's development team and those who don't attend the bimonthly community conversation meeting were not in favour of vaccinating their children. Pregnant women's conferences are held in each Kebele every month. A variety of topics on pregnancy, delivery, postnatal care, and the importance of immunization are raised and discussed monthly.

Theme: Decision-Making and Gender Influences

This theme focuses on caregivers' decision-making power and self-efficacy. Due to gender norms, it is often women's responsibility to bring children for vaccination, yet women in this study often faced gender-related barriers to doing so, including lack of autonomy to travel to the health facility, excessive workloads on mothers, economic dependency on their husbands, male involvement, and mother-in-law influence. These sub-themes are described as follows:

Lack of Autonomy to Travel to the Health Facility

Our analysis shows that women's autonomy to travel to health facilities is also a factor in influencing child immunization services. A 40-year-old FGD participant said:

"In our culture, a woman must obtain permission from her husband before travelling to a health facility, market, or any other gathering because he is the head of the family. Otherwise, she will probably lose her marriage."

Excessive Workloads on Mothers

Our analysis reveals mothers usually handle a larger portion of the hands-on childcare responsibilities and invest more time and energy in considering the needs of their families. As a result, mothers miss the scheduled vaccination session. A 33-year-old FGD participant said:

"As mothers, we have a lot on our plates, including childcare, farming, marketing, cooking, and other household chores. As a result, occasionally we forget to get all the necessary immunizations for our children."

Wives Economic Dependency on their Husbands

In this study, most mothers who missed the measles vaccination have an economic dependency on their husbands. A 37-year-old defaulted mother said:

"I usually use a motorcycle as a mode of transportation during the RI session. I need 75 birr for a round-trip every month. However, I am a housewife and economically dependent on my husband. Sometimes, I miss the vaccination session if my husband can't give me the money."

Male Involvement

Poor male involvement in the immunization program was identified as a determinate factor in this study. It seems husbands don't take child immunization as their responsibility. A 29-year-old mother with a measles-unimmunized child said:

"My husband had never accompanied me to the health facility for child immunization. Sometimes he refuses to give me money for transportation during RI sessions. I think he didn't expect that that was our shared responsibility."

Mother-in-Law Influence

The mother-in-law's influence was also identified as a reason for missing the measles vaccination. One young mother with an unimmunized child described her mother-in-law's influence on vaccination as follows:

"My mother-in-law usually says, God will protect him; don't go anywhere. Sometimes they tell us about how we grew up without vaccination and are still healthy." (a 20-year-old FGD participant)

Theme: Logistics and Accessibility

In this study, distance or geographic barriers and transportation costs were found to be barriers to measles vaccination. These sub-themes are described as follows:

Distance or Geographic Barriers

Some caregivers are missing immunization services because of distance and bad terrain, especially for villages surrounded by mountains and those that live in areas with inadequate transportation infrastructure. A 40-year-old defaulter's mother said:

"Because of the distance, I occasionally miss vaccination schedules. There is no transport access, and it took me more than three hours to make a round trip by foot. Moreover, these three villagers are not visiting the health post for immunization services in the rainy months of June, July, and August due to floods and overflowing rivers."

Transportation Cost

Each trip to the health facility is associated with transportation costs. In this study, some dropout caregivers were not economically capable of covering transportation costs during RI sessions. A 38-year-old defaulter said:

"My child received vaccinations for three rounds, and I'm aware that there is a remaining schedule. However, I couldn't get money for transportation. It is expensive to use a bajaj or motorcycle. We used to pay 80 birr for a round-trip trip to visit the health post."

Theme: Programmatic Factors

This theme mainly focuses on the perceived appropriateness and experiences of services, which embraces the inconvenience of vaccination dates, vaccine administration routes, and vaccination rounds.

Inconvenience of Vaccination Dates

Our analysis revealed that health posts are not providing immunization services daily. They operate only once a month, which is not convenient for mothers due to several reasons. A 28-year-old defaulter's mother said:

"We would prefer that the immunization schedule falls on the weekends because we are farmers. Surprisingly, the HEWs are operating the service on weekdays once a month, which is inconvenient for us." Another 37-year-old defaulter's mother complained:

"I did not find the immunization session to be convenient. My village observes a market day on that particular date."

Vaccine Administration Route

The vaccine administration route was identified as a barrier to measles vaccination. Most of the vaccines are injectable. However, compared to injections, mothers preferred oral drops. A 28-year-old defaulter's mother said:

"My child received several injections until he was 14 weeks old, which made him severely ill. Then I refused to come back for the nine-month schedule. I wish all vaccines were orally administered."

Vaccination Rounds

Our analysis revealed that some mothers complain about the vaccination rounds and number of vaccines given to their children. A 40-year-old FGD participant complained:

"Our children get vaccinated for five rounds during the routine immunization and several rounds of SIA campaigns. We prefer that the number of rounds be minimized."

Discussion

This study aimed to uncover drivers, reasons, and experiences of default and missed measles vaccination from a caregiver perspective. Four main themes were identified, which are lack of knowledge and information, mistrust, and rumours; decision-making and gender influences; logistics and accessibility; and programmatic factors.

This study revealed that most mothers whose children were not vaccinated or defaulted attended no formal education. The finding is consistent with studies done in Ethiopia [14,

22], Sudan [10], and Nigeria [23]. This is because educated women are more aware of the value of childhood vaccinations and have had more exposure to their advantages than mothers without formal education. In line with a previous study done in Ethiopia [12], young mothers better vaccinated their children compared to older ones owing to two main reasons: younger mothers have better education, and older mothers lived back to times when vaccination was not initiated, and hence neither they were vaccinated nor their firstborn children.

Our analysis identified a lack of information about the next appointment as a factor in defaulting or missing the measles vaccination. Some defaulter mothers believed their children had received all of the recommended vaccinations. The finding is in line with studies done in Ethiopia [9, 22]. This indicated that healthcare providers didn't explain when mothers should return for the next immunization. Moreover, some participants complained that upon their children's 14-week visit to the health post for vaccinations, the HEW administered three injections on their baby's thigh and two orally administered vaccines, which caused their children to become ill at night. This resulted in parents whining. Ultimately, they decided to skip the subsequent round—the measles vaccination at nine months—instead of returning. Furthermore, if the child becomes ill during the vaccination window, mothers usually choose not to bring their child to the health post for vaccination. They expect that the health status of the child may worsen. The finding is in agreement with a study done in Ethiopia [13] and Pakistan [24]. This might be due to health workers failing to provide information about possible AEFI and its management during immunization sessions.

Our study also identified a lack of trust in vaccines and providers and rumours about child vaccinations as reasons for missing or dropping the measles vaccination. In line with the previous studies done in Ethiopia [22], Pakistan [24], and Saudi Arabia (21), some mothers even assert that the vaccines may have constituents that can cause sterility, serious health effects, and death to reduce the country's population. Surprisingly, our analysis also uncovered that there are parents who believe that children who receive vaccinations behave against their culture, treat their parents disrespectfully, and begin having sex at a young age. Therefore, they refused to vaccinate their children. The finding is also supported by a study done in Pakistan [24]. This might be the result of the parents' inadequate knowledge and awareness of the benefits of immunizing their child. Hence, it's crucial to recognize that parental knowledge and behaviour have a big impact on missing or dropping the measles vaccination.

Our study revealed that mothers who don't participate in women's development team meetings are not in favour of vaccinating their children. Furthermore, pregnant mothers who attended a monthly pregnant women's conference found vaccinating their children more consistent than those who didn't participate in the conference. The finding is consistent with previous studies done in Ethiopia [14, 26]. This might be due to those mothers' missing important information on the importance of immunization. A variety of topics, including the benefits of immunization, are raised and discussed during the bimonthly women's development team meeting and the monthly pregnant women's conference. During discussions, women also share their experiences with their peers, learn from each other, and create an informal community network through which health information and support are fostered.

In this study, lack of autonomy to travel to the health facility, excessive workload, wives' economic dependency on their husbands, male involvement, and mother-in-law influence were identified as factors for missing or dropping measles vaccination. Some participants mentioned that a woman must obtain

permission from her husband before travelling to a health facility, market, or any other gathering because he is the head of the family. Otherwise, she will probably lose her marriage. Furthermore, most of the participants were housewives and economically dependent on their husbands. Hence, they usually miss the vaccination session if their husband can't give them money for transportation. The finding is consistent with studies done in Ethiopia [9], and Nigeria [27, 28]. This suggests that empowering women through livelihood empowerment initiatives can strengthen their ability to make decisions and their commitment to ensuring their children receive all recommended vaccinations [29].

Mothers have a lot on their plates, including childcare, farming, marketing, cooking, and other household chores. As a result, occasionally they forget to get all the necessary immunizations for their children. This finding is in line with previous studies done in Ethiopia [9, 30], Malawi [31], and Pakistan [24]. It is not surprising that mothers usually handle a larger portion of the hands-on childcare responsibilities and invest more time and energy in considering the needs of their families. Some participants mentioned their husbands had never accompanied them to the health facility for child immunization. Each trip to the health facility is associated with transportation costs. However, dropout caregivers were not economically capable of covering transportation costs during RI sessions. This is similar to findings from studies carried out in Ethiopia [32] and Nigeria [23, 33]. Hence, it might be necessary to develop and implement community-based intervention programs specifically for men, taking into account their traditional and cultural responsibilities.

Moreover, a mother-in-law's influence was also a reason for children missing the measles vaccination. Some participants mentioned that a mother-in-law usually says, God will protect our children; there is no need to go for immunization. Sometimes even they tell them about how they grew up without vaccination and are still healthy. The result is consistent with a study done in Kenya [34]. This might indicate that individuals outside of primary caregivers have a significant impact on caregivers' attitudes about vaccines, which in turn affects the community's acceptability and uptake of vaccines.

Distance or geographic barriers and transportation costs were identified as factors for missing or dropping the measles vaccination. Some mothers/caregivers do not visiting health posts for immunization services in the rainy months of June, July, and August due to floods and overflowing rivers. This finding is consistent with a study done in Uganda [35]. In addition, some mothers also occasionally miss vaccination schedules due to the distance of the health post. They reported that there was no transportation service to access the health service, and it took them more than three hours to make a round trip by foot. This finding is in line with studies done in Ethiopia [9, 12] and Nigeria [28]. Enhancing outreach services might be a feasible solution to address the barriers.

Health posts operate immunization services only once a month, which is not convenient for mothers due to several reasons. Mothers would prefer that the immunization schedule falls on the weekends because they are farmers. Surprisingly, the HEWs are operating the service on weekdays once a month. Furthermore, some participants also reported that their village observes a market day on the scheduled vaccination date. Our finding is in agreement with a systematic review conducted in sub-Saharan countries [36]. Therefore, the participation of community members in scheduling immunization sessions might help improve measles vaccination uptake.

Some mothers complain about the fact that their children are receiving too many vaccines. Which is five rounds in the routine immunization schedule and several rounds of

SIA campaigns. Hence, the frequency of the vaccination caused mothers to whine. The other point was the route of vaccine administration. Children at the age of 14 weeks usually receive three injections (PVT3, PCV3, and IPV1) at a time. As a result, there will be injection site pain following immunization, which will make the mother not return at nine months for the measles vaccination. As a consequence, compared to injections, mothers preferred oral drops. Our finding is in line with a previous study done in Zambia [37]. This might be because people don't like injections because they just know that injections are painful.

Strengths and Limitations of the Study

Because of its qualitative nature, this study has the advantage of better understanding and examining reasons for default or missed measles vaccination from a caregiver perspective that prior quantitative findings were unable to address. It also revealed how caregivers feel and experience before, during, and after points of service and identified their pain points. This study has its limitations of a qualitative nature. Even though the study samples were determined by the idea saturation of the study participants, they might not be representative of the general and diverse population, and the results cannot be generalized to other settings. In addition, the study encountered limitations, such as limited qualitative literature on vaccination to use in the discussion section for a comparison of the findings with other articles. Instead, some mixed studies were used due to a limited number of qualitative articles on child vaccination.

Conclusion

The findings of this study revealed that the measles vaccination is influenced by multiple factors. The implication is that intervention efforts should be tailored. Lack of knowledge, lack of information about when to return, lack of information about adverse events following immunization, lack of trust in vaccines and providers, rumours about child vaccination, and poor attendance in the women's development team and pregnant women's conference were found as reasons for missing or dropping the measles vaccination. Decision-making and gender influences like lack of autonomy to travel to health facilities, excessive workload, economic dependency on husbands, poor male involvement, and mother-in-laws' influence were identified as reasons for missing the scheduled vaccination. Geographic barriers and transportation costs were also found to be barriers to measles vaccination. Programmatic factors like inconvenience of vaccination dates, vaccine administration routes, and rounds of vaccination, were reported as reasons for missing or defaulting measles vaccination.

Acknowledgements

We would like to thank the Ministry of Health Ethiopia, Sodo, and South Sodo district health offices for their cooperation. Our appreciation also goes to health workers working at all levels and directly involved in the data collection. Finally, our gratitude also goes to the study participants for providing us with their time and giving us important information.

Conflict of interest

The authors declare no conflict of interest.

References

[1]. Centers for Disease Control and Prevention, 2024, "About Measles," Measles (Rubeola). [Online]. Available: https://www.cdc.gov/measles/about/index.html [Accessed: 23-Jun-2024].

[2]. World Health Organization, 2024, “Measles.” [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/measles [Accessed: 23-Jun-2024].
[3]. World Health Organization Regional Office for Africa (WHO-AFRO), 2024, “Vaccine-Preventable Disease Outbreaks on the Rise in Africa,” WHO | Regional Office for Africa. [Online]. Available: https://www.afro.who.int/news/vaccine-preventable-disease-outbreaks-rise-africa [Accessed: 31-Aug-2024].
[4]. World Health Organization, 2024, “Immunization Coverage.” [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/immunization-coverage [Accessed: 31-Aug-2024].
[5]. World Health Organization, 2023, “Measles - Ethiopia.” [Online]. Available: https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON460 [Accessed: 23-Jun-2024].
[6]. United Nations Children’s Fund, 2019, “The 2019 Ethiopia Mini Demographic and Health Survey | UNICEF Ethiopia.” [Online]. Available: https://www.unicef.org/ethiopia/reports/2019-ethiopia-mini-demographic-and-health-survey [Accessed: 14-Jul-2024].
[7]. Burton, A., Kowalski, R., Gacic-Dobo, M., Karimov, R., and Brown, D., 2012, “A formal representation of the WHO and UNICEF estimates of national immunization coverage: A computational logic approach,” *PLoS ONE*, **7**(10), p. e47806. https://doi.org/10.1371/journal.pone.0047806
[8]. Novilla, M. L. B., Goates, M. C., Redelfs, A. H., Quenzer, M., Novilla, L. K. B., Leffler, T., Holt, C. A., Doria, R. B., Dang, M. T., Hewitt, M., Lind, E., Prickett, E., and Aldridge, K., 2023, “Why parents say no to having their children vaccinated against measles: A Systematic Review of the Social Determinants of Parental Perceptions on MMR Vaccine Hesitancy,” *Vaccines (Basel)*, **11**(5), p. 926. https://doi.org/10.3390/vaccines11050926
[9]. Adugna, B., Tola, A., Fite, M. B., and Motuma, A., 2024, “Determinants of second-dose measles vaccination dropout in Ethiopia: A community-based matched case-control study,” *Heliyon*, **10**(9), p. e30764. https://doi.org/10.1016/j.heliyon.2024.e30764
[10]. Sabahelzain, M. M., Moukhyer, M., van den Borne, B., and Bosma, H., 2022, “Vaccine hesitancy among parents and its association with the uptake of measles vaccine in Urban Settings in Khartoum State, Sudan,” Vaccines, **10**(2), p. 205. https://doi.org/10.3390/vaccines10020205
[11]. Majekodunmi, O. B., Oladele, E. A., and Greenwood, B., “1 Title: Factors Affecting Poor Measles Vaccination Coverage in Sub- 2 Saharan Africa with a Special Focus on Nigeria: A Systematic 3 Review.”
[12]. Abegaz, M. Y., Seid, A., Awol, S. M., and Hassen, S. L., 2023, “Determinants of incomplete child vaccination among mothers of children aged 12–23 Months in Worebabo District, Ethiopia: Unmatched Case-Control Study,” *PLOS Global Public Health*, **3**(8), p. e0002088. https://doi.org/10.1371/journal.pgph.0002088
[13]. Tadesse, T., Getachew, K., Assefa, T., Ababu, Y., Simireta, T., Birhanu, Z., and Hailmichael, Y., 2017, “Factors and misperceptions of routine childhood immunization service uptake in Ethiopia: findings from a nationwide qualitative study,” *Pan African Medical Journal*, **28**. https://doi.org/10.11604/pamj.2017.28.290.14133
[14]. Hailu, C., Fisseha, G., and Gebreyesus, A., 2022, “Determinants of measles vaccination dropout among 12 − 23 Months Aged Children in pastoralist community of Afar, Ethiopia,” *BMC Infectious Diseases*, **22**(1), p. 376. https://doi.org/10.1186/s12879-022-07350-1
[15]. Sako, S., Gilano, G., and Hailegebreal, S., 2023, “Determinants of childhood vaccination among Children Aged 12–23 months in Ethiopia: A community-based cross-sectional

study," *BMJ Open*, **13**(3), p. e069278. https://doi.org/10.1136/bmjopen-2022-069278
[16]. Shearer, J. C., Nava, O., Prosser, W., Nawaz, S., Mulongo, S., Mambu, T., Mafuta, E., Munguambe, K., Sigauque, B., Cherima, Y. J., Durosinmi-Etti, O., Okojie, O., Hadejia, I. S., Oyewole, F., Mekonnen, D. A., Kanagat, N., Hooks, C., Fields, R., Richart, V., and Chee, G., 2023, "Uncovering the drivers of childhood immunization inequality with caregivers, community members and health system stakeholders: Results from a Human-Centered Design Study in DRC, Mozambique and Nigeria," *Vaccines*, **11**(3), p. 689. https://doi.org/10.3390/vaccines11030689
[17]. Moser, A., and Korstjens, I., "Series: Practical Guidance to Qualitative Research. Part 1: Introduction," *Eur J Gen Pract*, **23**(1), pp. 271–273. https://doi.org/10.1080/13814788.2017.1375093
[18]. Ethiopian Statistical Service, 2024, "Population Projection." [Online]. Available: https://www.statsethiopia.gov.et/population-projection/ [Accessed: 13-Oct-2024].
[19]. United Nations Children's Fund, 2018, "Demand for Health Services | UNICEF Office of Innovation." [Online]. Available: https://www.unicef.org/innovation/reports/demand-health-services [Accessed: 22-Jun-2024].
[20]. Technical Network for Strengthening Immunization Services (TechNet-21), 2023, "BeSD Childhood Vaccination In-Depth Interview Guides," TechNet-21. [Online]. Available: https://www.technet-21.org/en/resources/tool/besd-childhood-vaccination-in-depth-interview-guides [Accessed: 01-Sep-2024].
[21]. Ogunbanjo, G., Mabuza, L., Govender, I., and B, M., 2014, "Qualitative Data Analysis and Writing Results (Workshop)."
[22]. Guye, A. H., Nigussie, T., Tesema, M., Shambi, D. B., Diriba, B. S., Tefera, E. M., and Girma, Y., 2023, "Exploring barriers of childhood full vaccination among children Living in Siraro District, West Arsi Zone, Oromia Region, Ethiopia: A Qualitative Study," *Front. Pediatr.*, **11**. https://doi.org/10.3389/fped.2023.1083358
[23]. Sodeinde, K., Amoran, O., Abiodun, O., Adekoya, A., Abolurin, O., and Imhonopi, B., 2020, "A rural/urban comparison of paternal involvement in childhood immunisation in Ogun Central Senatorial District, Nigeria," *The Nigerian postgraduate Medical Journal*, **27**, pp. 336–342. https://doi.org/10.4103/npmj.npmj_101_20
[24]. Ullah, K., Saleem, J., Zakar, R., Ishaq, M., Khattak, F. A., Majeed, F., Sadiqa, H. A., and Fischer, F., 2024, "Exploring the reasons for defaulting from childhood immunization: A Qualitative Study in Pakistan," *BMC Public Health*, **24**(1), p. 408. https://doi.org/10.1186/s12889-024-17926-y
[25]. Thirunavukkarasu, A., Alanazi, M. F. A., Al-Hazmi, A. H., ALruwaili, B. F., Alsaidan, A. A., Alruwaili, T. A. M., Algaed, M. A. M., Alsharari, A. K., Alenazi, R. H., Alshalan, A. M., and Alshalan, S. M., 2023, "Maternal perception, hesitancy, and satisfaction toward Childhood Immunization in Primary Health Centers, Hafr Al-Batin: A Multicenter Cross-Sectional Study from Eastern Saudi Arabia," *RMHP*, **16**, pp. 2357–2368. https://doi.org/10.2147/RMHP.S406933
[26]. Yitbarek, K., Abraham, G., and Morankar, S., 2019, "Contribution of Women's Development Army to maternal and Child Health in Ethiopia: A Systematic Review of Evidence," *BMJ Open*, **9**(5), p. e025937. https://doi.org/10.1136/bmjopen-2018-025937
[27]. Adesina, M. A., Olufadewa, I. I., Oladele, R. I., Solagbade, A., and Olaoyo, C., 2023, "Determinants of childhood immunization among Rural Mothers in Nigeria," Popul. Med., **5**(September), pp. 1–7. https://doi.org/10.18332/popmed/171542
[28]. Kolawole, O. T., Akinyemi, A., and Solanke, B. L., 2023, "Household Vulnerability and Childhood Immunization Status in

Nigeria," *SAGE Open*. https://doi.org/10.1177/21582440231179943
[29]. Amoah, A., Issaka, J., Ayebeng, C., and Okyere, J., 2023, "Influence of women empowerment on childhood (12–23 Months) Immunization Coverage: Recent Evidence from 17 Sub-Saharan African Countries," *Tropical Medicine and Health*, **51**(1), p. 63. https://doi.org/10.1186/s41182-023-00556-2
[30]. Simegn, W., Diress, M., Gela, Y. Y., Belay, D. G., Ayelign Kibret, A., Chilot, D., Sinamaw, D., Abdu Seid, M., Andualem, A. A., Anmut Bitew, D., Eshetu, H. B., and Mohammed Seid, A., 2023, "Childhood Vaccination Practices and Associated Factors among Mothers/Caregivers in Debre Tabor Town, Northwest Ethiopia: A Cross-Sectional Study," *Front Pediatr*, **11**, p. 1070722. https://doi.org/10.3389/fped.2023.1070722
[31]. Powelson, J., Kalepa, J., Kachule, H., Nkhonjera, K., Matemba, C., Chisema, M., Chumachapera, T., and Lawrence, E., 2024, "Using Community-Based, Participatory Qualitative Research to Identify Determinants of Routine Vaccination Drop-out for Children under 2 in Lilongwe and Mzimba North Districts, Malawi," *BMJ Open*, **14**(2), p. e080797. https://doi.org/10.1136/bmjopen-2023-080797
[32]. Gelagay, A. A., Geremew, A. B., Teklu, A., Mekonnen, Z. A., Gera, R., Ba-Nguz, A., and Tilahun, B., 2021, "Full Immunization Coverage and Its Determinants among Children Aged 12-23 Months in Wogera District, Northwest Ethiopia," *Ethiopian Journal of Health Development*, **35**(3). [Online]. Available: https://www.ajol.info/index.php/ejhd/article/view/217886 [Accessed: 07-Jul-2024].
[33]. Okafor, I. P., Chukwudi, C. L., Igwilo, U. U., and Ogunnowo, B. E., 2022, "'Men Are the Head of the Family, the Dominant Head': A Mixed Method Study of Male Involvement in Maternal and Child Health in a Patriarchal Setting, Western Nigeria," *PLOS ONE*, **17**(10), p. e0276059. https://doi.org/10.1371/journal.pone.0276059
[34]. Mogoi, D., Muchiri, E. M., and Mutuma, A. M., 2020, "Vaccine Coverage of Newly Introduced Vaccines and Factors Influencing among Children Less Than 23 Months in Laikipia North Subcounty," *Open Journal of Preventive Medicine*, **10**(2), pp. 9–43. https://doi.org/10.4236/ojpm.2020.102002
[35]. Malande, O. O., Munube, D., Afaayo, R. N., Annet, K., Bodo, B., Bakainaga, A., Ayebare, E., Njunwamukama, S., Mworozi, E. A., and Musyoki, A. M., 2019, "Barriers to Effective Uptake and Provision of Immunization in a Rural District in Uganda," *PLoS One*, **14**(2), p. e0212270. https://doi.org/10.1371/journal.pone.0212270
[36]. Bangura, J. B., Xiao, S., Qiu, D., Ouyang, F., and Chen, L., 2020, "Barriers to Childhood Immunization in Sub-Saharan Africa: A Systematic Review," *BMC Public Health*, **20**(1), p. 1108. https://doi.org/10.1186/s12889-020-09169-4
[37]. Pugliese-Garcia, M., Heyerdahl, L. W., Mwamba, C., Nkwemu, S., Chilengi, R., Demolis, R., Guillermet, E., and Sharma, A., 2018, "Factors Influencing Vaccine Acceptance and Hesitancy in Three Informal Settlements in Lusaka, Zambia," Vaccine, **36**(37), pp. 5617–5624. https://doi.org/10.1016/j.vaccine.2018.07.042