

Knowledge and Uptake of Measles Vaccination Second Dose (MCV2) among Children under 5 in Ebonyi State, Southeastern Nigeria

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Abstract

Measles, a viral highly contagious infection, has posed significant threats to the lives of children globally. Introduction of Measles-Containing Vaccines has significantly reduced the burden of measles and prevented outbreaks of measles disease and averted deaths of children under 5 years old. This study aimed at examining the knowledge of health care providers of the measles-containing vaccine second dose (MCV2) in Ebonyi State, ascertain the level of uptake, explore the barriers and challenges, and propose the strategies that can be recommended to mitigate the challenges. A purposive sampling approach was employed that sought to identify specific groups of study participants who possessed the characteristics of, or lived in settings relevant to, the social phenomenon under study. Nurses, CHEWs, and other health practitioners who have in one/many way(s) rendered immunization services were included. Data collection was in the form of audio recordings of focused group discussions with study participants on the research subject using a validated interview guide. The result showed low uptake of MCV 2 across the facilities in the State, ignorance, forgetfulness and misconceptions among other factors are responsible for low uptake. Suggested ways to increase the uptake include periodic tracking and intensification of routine immunization, factoring engagement of adhoc health workers into facility business plan, and increased incentives. The study participants' knowledge and perception of factors affecting uptake of MCV2 among under 5 children in Ebonyi State is consistent with evidence produced by other studies on the subject matter.

Keywords: Knowledge, Low, MCV2, Uptake.

Introduction

Measles disease, a viral highly contagious infection, has posed a significant threat to the lives of children globally. The introduction of Measles-Containing Vaccines has significantly reduced the burden of measles and prevented outbreaks of measles disease [1] and averts

deaths of children under 5 years old [2]. However, the second dose (measles-containing vaccine (MCV2)) was introduced to secure complete protection against the disease and provides herds immunity [3]. Ebonyi Health Management Information System records show consistently low uptake of the second

dose among children under 5 (Ebonyi State DHIS 2 data of 2020-2022).

This research aims to unravel the effects of knowledge, attitudes, and perceptions of parents and caregivers on the Uptake of Measles Vaccination Second Dose (MCV2) among Children Under 5 in Ebonyi State, Southeastern Nigeria, and contribute to the existing body of knowledge on immunization programs and public health. Through an in-depth exploration of these factors, we can gain valuable insights and propose evidence-based solutions to address the challenges faced in the vaccination coverage of measles MCV 2 among children under 5 in Ebonyi State.

The findings of this study will not only provide a comprehensive understanding of the specific barriers to vaccination but also inform policymakers, healthcare providers, and stakeholders on the necessary interventions and strategies needed to improve the uptake of the second dose of measles vaccination. Ultimately, the goal is to enhance the overall immunization coverage and protect children from the devastating consequences of measles in Ebonyi State, Southeast Nigeria.

This study sought to examine the knowledge of health care providers of the measles-containing vaccine second dose (MCV2) in Ebonyi State, ascertain the level of uptake of the MCV 2 vaccine in Ebonyi State, explore the barriers and challenges faced by parents and caregivers in accessing and receiving the MCV 2 vaccine in Ebonyi State, and propose the strategies that can be recommended to immunization Stakeholders for improved vaccine uptake.

Research Questions

1. What is the coverage of measles vaccination second dose and the role of healthcare systems?
2. To what extent does knowledge of healthcare providers contribute to the uptake of Measles vaccination second dose?

3. What are the barriers and challenges faced by parents and caregivers in accessing and receiving the MCV 2 vaccine in Ebonyi State?

4. What strategies can be recommended to immunization Stakeholders for improved vaccine uptake?

Significance

This research effort seeks to identify factors contributing to the poor uptake of the second dose of MCV. Findings from this study will invariably be used to improve the uptake of the second dose measles vaccine (MCV 2) and consequently contribute to the elimination of measles in Ebonyi state.

Literature Review

Vaccination was seen as one of the most effective public health interventions [4-6], and that uptake of vaccination services does not only depend on the quality of these services but also on some other factors which include knowledge and attitude of the parents. The team also discovered that delays in the uptake of immunization services were mainly due to insufficient information about the importance of vaccination, child illness, negative knowledge about the vaccines and vaccine deficiency [6].

Implementing the World Health Organization's (WHO)-recommended immunization schedule [7] has resulted in declining morbidity and mortality associated with vaccine-preventable diseases (VPDs). The immunization coverage rate is considered a surrogate measure of protection [5]. Of the estimated 19.5 million infants not reached with routine immunization services worldwide in 2016, 60% of them live in 10 countries including Nigeria. Of serious concern is the abysmally low full immunization coverage in Nigeria with a concomitant high mortality largely attributed to vaccine-preventable diseases [7].

Studies have produced evidence that incomplete immunization is a significant public health problem [8] and [5] as well as that low coverage rates can affect herd immunity, and therefore pose a threat to outbreaks. Children depend on their parents and, or caregivers to access immunization services, which means that caregivers play a critical role in ensuring full compliance with immunization schedules and achievement of full immunization status [9].

A study has it that various reports revealed that VPDs account for 25% of deaths occurring annually among children less than 5 years of age [10]. Children who are exposed to these preventable diseases usually suffer from numerous growth and developmental squeals [11] and [12]. Thus, VPDs create a significant economic and social crisis among individuals, families, and communities [10].

Ethiopian Mini Demographic and Health Survey in 2019 [13] showed that the under-five mortality rate was 55 deaths per 1000 live births, close to 2 in 10 children (19%) have not received any vaccinations at all and only 4 out of 10 children (43%) have received all basic vaccinations [10].

A community-based cross-sectional study on the Factors Associated with Low Coverage of the Second Dose of Measles Containing Vaccine (MCV) among Children Aged 19-59 Months, in Alego-Usonga Sub-County, Kenya, came up with the evidence that there was low MCV2 coverage which they concluded to be significantly associated with low MCV2 vaccination, lack of caregiver awareness of MCV2, and vaccine stock-outs were the major reasons for non-vaccination with MCV 2 among other identified factors [14].

Other studies revealed several factors that are related to low immunization status to include: economic status, settlement type, age and sex of a child, long-distance to a health facility, poor access to immunization service, poor health infrastructure, poor awareness of mothers/caregivers, mothers' perception to the

accessibility of vaccines, missed opportunity, place of delivery, living altitude, inadequate human resource for health, and high staff turnover [15] and [16].

A similar study in Nigeria observed that though immunization is proven to be the most successful and cost-effective public health intervention in reducing childhood morbidity and mortality [6] (as it averts 2 to 3 million deaths every year), the global vaccination coverage has remained stalled at 86% from 2010, without any changes during the past years [7].

Inadequate knowledge of immunization and the perception of caregivers have been reported to be among hindrances to vaccination uptake [17, 18]. This means that there is a need to equip the public with the requisite knowledge about vaccination against VPDs, the recommended schedule, and the benefits of getting every child to be fully immunized [19].

A study that assessed the knowledge, attitude, and practices of caregivers on childhood immunization, observed that there are still issues of vaccine hesitancy especially in caregivers whose responsibility it is to protect their children from VPDs [18]. This has negatively affected the overall vaccine coverage in disease-endemic areas such as sub-Saharan Africa. Poor knowledge of vaccination and its benefits among caregivers have been reported in the community [18], a situation that affected their adherence to vaccination schedules, and consequent incomplete immunization of children in the community by their caregivers. Another study by [20] assessing the knowledge level among Saudi Parents about vaccination showed that 73.3% of parents reported having a good understanding of childhood immunization, and 9% were aware that regular vaccinations shield kids from infectious diseases and associated repercussions.

Equipping mothers with the prerequisite knowledge about the benefits of

immunization, which invariably impacts their attitude and encourages their participation in vaccination services, is a major contributor to achieving vaccination coverage and uptake [17]. A gradual decline in the uptake of vaccines, due to caregivers' failure has been reported [3] in [18], even though vaccines are known to provide herd immunity by preventing infectious diseases in the adult population. Most studies on the effects of knowledge, attitudes, and perceptions of parents and caregivers on the Uptake of Measles Vaccination Second Dose (MCV2) among Children Under, including the literature reviewed in this study, are each a national or inter-countries study. The few that did subnational studies left a knowledge gap in Ebonyi State, Southeastern Nigeria. This research is, therefore, designed to fill this gap.

Materials and Methods

Participants

In this study, a purposive sampling approach was employed that sought to identify specific groups of study participants who possessed the characteristics of, or lived in settings relevant to, the social phenomenon under study. In this case, only the nurses CHEWs, and other health practitioners who have in one/many way(s) rendered immunization services were included [21]. Data collection was in the form of audio recordings of focused group discussions with study participants on the research subject using a validated interview guide. The duration of engagement with the study participants through the discussion sessions was sufficiently long. The recorded conversations, including nonverbal observations, were transcribed verbatim by the researcher by a single transcription approach. Transcribed data was stored in a secure personal laptop computer. Meticulous records of the interview conversations and observations, together with documentation of

the process of analysis in detail, ensured the credibility of the data analysis [22].

Procedure

Focus group discussions were held until saturation of new information was relatively reached, as in qualitative research sample size can never be predetermined [23]. To be sure we did not miss any 'significant' information, one additional focus group session was held after theoretical saturation was estimated. All focus groups were organized at the health facility at a time and date convenient for the health practitioners and researchers team. Before each focus group, all participants were asked to complete a short questionnaire containing demographic characteristics which include sex, age, educational status, cadre, and years of experience (see Table 1). Furthermore, an explanation about the aim of the study was given and an informed consent (in which participants' anonymity and confidentiality were assured) was signed by each participant. Each focus group lasted between 90 and 120 minutes (including follow-up questions that were not included in this paper) and was facilitated by a moderator and an assistant moderator (observer), who took notes during the discussions and made sure the moderator did not overlook any participants trying to add comments. All focus group discussions were audiotaped with the permission of the participants. Drinks and snacks were provided during the focus group discussions. Afterward, all students received an incentive (a lunch voucher). The study was approved by the Research Ethics Review Committee of Ebonyi State Ministry of Health, Abakaliki.

Question Guide

According to the recommended focus group methodology [23], a semi-structured question guide (see Table 1) was developed by the researcher, aiming to unravel the effect of knowledge, attitude, and practice of parents

and caregivers on the uptake of MCV2. As mentioned before, this paper will only focus on the knowledge, attitude, and practice of parents and caregivers on the uptake of MCV2. After intensive collaboration with experts with ample focus group experience, the questions were carefully developed using appropriate literature [23]. When the development was completed, the question guide was tested within and revised by the researchers. The question guide consisted of opening and introductory questions which allowed participants to get acquainted and feel connected, and to start the discussion of the topic. Transition and key questions were used to respectively, guide the group toward the main part of the discussion and to focus on the purpose of this study, that is, identifying factors that affect the uptake of MCV2. For obvious reasons, the greatest share of the group discussions focused on the key questions. Finally, participants were asked to share ideas concerning health promotion as well as intervention strategies to counter the low uptake of MCV2 among caregivers and parents. During the focus group discussions, the moderator followed the question guide but

asked side questions to obtain more in-depth information about the topics, and showed enough flexibility to allow open discussions between the health practitioners.

Data Analysis

IBM SPSS Statistics Version 25 was used to analyze and calculate descriptive statistics of the focus group sample. Data obtained from the audio tapes were transcribed verbatim in Microsoft Word using Express Scribe and Windows Media Player. All quotes were encoded using the qualitative software program Nvivo 11. Using an inductive thematic approach, data (quotes) were examined for recurrent instances of some kind, which were then systematically identified across the data set, and grouped together by means of a coding system (= content analysis) [24]. Similar codes were grouped together into more general concepts (sub-categories) and further categorized into main categories. To ensure the reliability of data interpretations, analyses were carried out independently by two researchers. Doubts or disagreements were discussed with two other researchers until a consensus was reached.

Table 1. Focus Group Question Guide

Question type	Question
Opening	• Can we identify ourselves?
Introduction	• Describe your knowledge of the immunization schedule.
Key	• How many doses of MCV do we have?
	• What is the age and antigen for the fully immunized child(ren)?
	• Are there times or circumstances in which the MCV is contraindicated?
	• What are the reasons for defaulting the MCV 2 by
	-Mother/caregivers?
	-Health Care Workers?
	-Health system?
	• How is MCV coverage in your facilities?
	• Which type of settlements houses more of the defaulter - Rural.-Semi-Urban, Urban?
Ending	• What are your challenges?
	• How can we mitigate the challenges and improve uptake.

Result

In this study, the estimated point of saturation was observed after the fourth focus group session. One additional focus group discussion was conducted to be sure true saturation was established. In total, five focus group discussions were conducted, consisting of five to seven participants per group. The sample (n = 30) consisted of 3 (10.0) male and

27 (90.0) female health practitioners. The majority of them, 12 (40.0%) were between 41 – 50 years of age, and 10 (33.3%) were more than 50 years. More than half of the proportion of the participants 19 (63.3%) were CHEWs and all of them have more than 10 years of experience. Additional sample characteristics are described in Table 2.

Table 2. Characteristics of Focus Group Participants (n = 30)

Characteristics	Frequency	Percentage
Sex		
Male	3	10.0
Female	27	90.0
Age Group		
20 – 30yrs	1	3.3
31 – 40yrs	7	23.3
41 – 50yrs	12	40.0
51 years & above	10	33.3
Educational Status		
Cadre Nurse	2	6.7
CHEWs	19	63.3
Others	14	46.7
Years of Service		
10yrs & above	30	100.0

The thematic index summarizes the key findings in this study. Eight themes were

constructed from the study analysis in line with the study objectives (Table 3).

Table 3. Themes, Codes, and Categories

Study Objectives	Themes	Codes and categories
Knowledge of MCV	1.1 First antigen	1.1.1. Immediately at birth
	1.2 Doses of MCV	1.2.1 Doses of MCV
	1.3 Duration of MCV	1.2.1 Duration of first dose of MCV
		1.2.2 Duration of second dose of MCV
		1.2.3 Missed schedule
Uptake of MCV2	2.1 Contraindications	2.1.1 Contraindications
	2.2 Reactions	2.2.2 Reaction to the first dose d
	2.3 Reason for defaulting	2.3.3 Reason for defaulting
Challenges to uptake of MCV2	3.1 Challenges	3.1.1 Challenges to uptake of MCV2
A possible solution to low uptake of MCV2	4.1 Possible solution	4.1.1 Possible solution to low uptake of MCV2

Knowledge of MCV

First Antigen

The majority of the health practitioners interviewed were able to list at least one antigen given to infants after birth. One of them mentioned 3 which were BCG, OPV0, and HPV0. Every other person either repeated all of these or fewer.

Doses of MCV

When asked how many times the measles-containing vaccines are supposed to be given to a child, almost all the participants shouted “Two”. One of them even repeated the same in his own words, “Yes it is two times”.

Duration of MCV

Participants agreed that a child is supposed to take the first MCV at nine months of birth. A particular participant retorted, “It is at the ninth month, and we meant nine months from birth”. On the supposed time for the second vaccine, all the health practitioners agreed that it would be in the 15th month. One of the participants expressed her opinion, thus: “first dose is supposed to be at 9 months and the second dose at 15th month. Even if the woman comes a little later, 10th month, 11th month, the person should still come back at 15 months for the second dose.”

Uptake of MCV 2

All the healthcare workers in attendance, responding to the question of level of uptake, unanimously echoed “We have low coverage of the MCV 2 in our facilities”.

Contraindications

Some study participants also expressed their opinions about times or circumstances in which the measles-containing vaccine may not be administered. All of them agreed that at one point or the other, there are circumstances in which they may not have to give a child measles vaccines. Their suggestions were, “When the child has critical signs of measles

infection like rashes all over the body”. Another participant contributed that it could be, “*when there are sores in the mouth and mucus membrane*”. Every contraindication mentioned always received affirmation from every other participant. Other participants also mentioned “*evidence of high fever, and presence of conjunctivitis.*”

Reaction of the First Dose

When a woman is coming for a second dose, but the child had an anaphylactic reaction to the first one or has not received any vaccine till 23 months of their baby. The participants opined, “*You know that when we are talking about R.I., we have a target, and our target is 23 months. So, by the time this child is more than 23 months old and shows up, you are not going to give any such child any measles-containing vaccine.*” But one of the participants came up with a contrary opinion to this; ‘when there is a campaign,’ “*Okay. Nine months. Okay. So, when there is a campaign. like a measles campaign? Yes, once a child is less than five years old. That child can be vaccinated.*”

Reasons for Defaulting

One of the participants said that while she was interviewing some mothers, they advanced the following reasons for defaulting: (a) *I forgot to come back for the second dose of the vaccine.* (b) *I was not aware, neither was I informed about the second dose. This is a gap in health workers’ attitudes and practices.* (c) *My husband prevented me from coming for the vaccine, especially the second dose, since the child has taken the first dose.* (d) *Some of the women claimed to be busy either as farmers or businesswomen.*

Other reasons for defaulting as perceived by the participants included: when the child had had previous adverse reaction to vaccines, it could discourage the mother from coming for the complete dose(they take it as false health claims); accessibility of the health facility;

lack of transport fare to go to the facility to uptake the MCV 2, and also when there is delay in receiving the vaccine from the health workers for any reason, or, failure to access because there were not enough clients to warrant opening a new vial of the vaccine.

If there is any occurrence of the disease and the child survives, the mother assumes that the child has acquired natural immunity against measles infection. Sometimes there could be vaccine stock-out, rumors of fake vaccines, communal crises, and relocation of family or family crises.

Another health practitioner gave her reason to be that the parents no longer take any interest in immunization after the first dose of the measles vaccine, which is taken at 9 months. Another participant said that failure to take-up MCV2 can be attributed to the absence of the mother/caregiver, *“The mother might be traveling... The mother might be sick ... The mother might also travel or relocate, so, the mother is no longer in that environment, so there is nobody to bring that child”*. Some caregivers would like to go to another facility to access services.

One of the participants said, *“Before we did give nursing mothers a gift of ITN after the first dose of the measles vaccine, now, we are telling them, if you do not receive the second dose, we will not give you the gift you're supposed to give to children for attaining the fully immunized status.”* A different reason suggested by one of the participants was that it could come from the husband of the mother/caregiver, *“So even the husband might feel that he has taken the first dose, so he does not need another one. So, their spouses used to stop them.”*

Some mothers forget, and some lose interest as soon as they have taken the child to the health facility for the first dose. Some say that they are busy. When the child had had an Adverse Event Following Immunization (AEFI), a situation when a child had a

measles-like infection even after receiving the first dose could also be a reason.

Challenges

There are many challenges encountered by health workers in the discharge of their duties generally and in ensuring the administration of MCV2 to eligible children. These challenges could come from the Healthcare system, the caregivers, or, from the happenings, and even the security situation. The majority of the health practitioners lamented the paucity of funds and other resources, *“so lack of logistics”*. Another diverse challenge is the distance between health facilities and the location of the caregivers and even those of the healthcare providers. The healthcare providers also decried the lack of adequate human resources for health.

Possible Solutions

Suggestions on how to increase the uptake of MCV2 by the caregivers from the participants may be through campaigns by the government *“Like what used to happen during campaigns. You know, the government used to hire adhoc workers. Let me say hire. I will call it a hire. That is employing the health workers. Engage health workers. Okay. And also, when you engage them to help and track those women, they can find a way and just track them.”* One of the participants suggested tracking the supposed beneficiary, *“It is the strategy that is helping us to reach them now. But you know, it is not easy when one or two people are going house to house.”* Participants, responding to the follow-up question of what they can do by themselves to mitigate the challenges as well as caregivers' reasons for defaulting, to ensure good immunization coverage, advanced the following: (a) *Changing the time of giving the incentive (ITN) to the caregivers from 9 months to 15 months, after the second dose is taken.* (b) *Factoring the engagement of adhoc health workers into their Business Plans.* (c)

Being more deliberate in health-educating mothers and caregivers on the need to take up a second dose of MCV 2 to have the child fully immunized. (d) Employing the use of the Tickler System to remind caregivers of their immunization appointments and to track defaulters. (e) Periodic baby tracking and intensification of routine immunization targeting settlements with a higher number of defaulters.

Discussion

This study sought to ascertain the knowledge and uptake of measles vaccination second dose (MCV 2). The results show that ignorance of the second dose is the most significant barrier affecting the uptake of the second dose of measles vaccine in addition to forgetfulness, unavailability of the vaccine in the facility, assumption that the first dose is adequate for the child, relocation, frequent cancellation of immunization sessions, being indisposed to go to the facility and children getting sick after the first dose.

The study which was conducted among Health Facility workers who have been experienced in the work and of course, demonstrated good knowledge of Measles-Containing vaccine by correctly responding to the interview guide items, designed to assess the knowledge level of the participants. The participants had good grasp of the WHO recommended immunization schedule which includes the measles-containing vaccine doses.

On the coverage of MCV2 all participating health workers unanimously echoed "We have low coverage of the MCV 2 in our facilities" thus confirming the State DHIS 2 immunization data. This result is consistent with the conclusion of a research team [14], in their study on the "Factors Associated with Low Coverage of the Second Dose of Measles Containing Vaccine (MCV) among Children Aged 19-59 Months, in Alego-Usonga Sub-County, Kenya" produced evidence that showed that lack of caregiver awareness of

MCV2 and vaccine stock-outs were the major reasons for non-vaccination with MCV 2, and [9] identified failure of caregivers to take their children to the facility for vaccination as part of the reason for low coverage.

Ignorance appeared to be the most dominant factor: a vice that can only be overcome with knowledge, efforts should be channeled into putting out relevant information about the availability and necessity of the vaccine (MCV2) through direct communication. The ability to present relevant and available information to people, ensuring that the right information reaches the end user will help in militating ignorance of the second dose of the measles vaccine. [25] in their review state that certain aspects of community engagement itself, such as conducting stakeholder consultations, holding community dialogues or involving community leaders were associated with better immunization outcomes. Their research proved that community engagement interventions hold promise for improving child immunization coverage in LMICs. Involving communities in decision-making processes, fostering trust in vaccines, and addressing local barriers to immunization, are interventions that can contribute to achieving equitable immunization coverage and reducing vaccine-preventable diseases in vulnerable populations. In conclusion, they stated that community engagement interventions are successful in improving outcomes related to routine child immunization [26] identified caregivers' ignorance of recommended ages for first and second doses, health facility vaccination sessions scheduled to hold once or twice weekly intervals, vaccine stock-out, refusal of health service providers to open multi-dose vials for a single child and long waiting times as being associated with poor uptake of MR2 vaccine.

Responses from the participants of the focused group discussions show forgetfulness, children getting sick after the first dose and

assumption that the first dose is enough for the child as factors that affect the uptake of (MCV2). Many parents and caregivers tend to forget immunization schedules and assume that the first dose is sufficient for the child due to busy work schedules while some tend to develop apathy because the child got sick after the first dose. Health care workers were seen as the primary source of vaccine information to caregivers and community [27, 28] suggested that provider-parent communication is important to achieving childhood vaccine coverage. Appreciating that a child's provider plays a key role in parental vaccine decision-making and is a trusted source of vaccine information, contrary to expectation, many healthcare providers did not give a rationale for the vaccine(s) recommended neither did they discuss the potential side effects of the recommended vaccines and how to manage it. Therefore, the need to train healthcare providers on how to effectively communicate with patients about the vaccine (relevance and schedules), addressing concerns and providing evidence-based information to help individuals make informed decisions about vaccination.

Some caregivers complained that they were prevented by their husbands from taking the baby back to the facility for the second dose of measles vaccines. This evidence is consistent with the result of the study conducted by [29] in which they stated that 'lack of consensus among parents affects uptake of vaccinations. They also observed that some parents held misconceptions about the risks associated with new vaccines and preferred natural immunity over vaccination, the majority expressed concerns about the potential adverse effects of vaccines but recognized their effectiveness in strengthening the immune system. Other studies [30] and [31] incriminated parents' objection, disagreement, or concern about immunization safety, long-distance walking, and long waiting times at the health facility as the most common factors responsible for

missed opportunities and incomplete immunization.

These results are consistent with previous studies on parental attitudes toward vaccination. For example, a review by [32] found that most parents agreed that vaccines are important for their child's health. Similarly, another study aimed to assess parents' attitudes toward the human papillomavirus vaccine found that most parents recognized the importance of vaccination in preventing infectious diseases [33]. However, similar to this study, other researchers have also found that misconceptions and concerns about vaccines remain prevalent among some parents.

This study revealed that 51.8% of parents believed that new vaccines carry more risks than old vaccines, which is similar to findings reported by previous studies [34]. Moreover, 69.1% of parents objected to their child receiving more than five types of vaccines during a single doctor's visit, which is higher than the rate reported in a previous study [35].

In contrast, the study found that 61.1% of parents disagreed that a high number of vaccines during the first two years of life might weaken their child's immune system, which aligns with previous findings [36]. Besides, 54.2% of parents disagreed that vaccines are given against non-dangerous diseases, a belief previously reported in different populations [37].

Regarding the belief that a high number of vaccines during the first two years of life can weaken a child's immune system, 61.1% of parents disagreed or strongly disagreed. This finding is consistent with previous studies that showed that this belief was more prevalent among vaccine-hesitant parents and those who refused vaccination [38].

Concerning worries about the potential side effects of vaccines, our study found that 44.5% of parents agreed with this statement. This finding is in line with another study, which found that many parents have concerns about

vaccine safety [39]. The desire for more comprehensive information about vaccines to alleviate concerns was expressed by the majority of parents (78.7%) in our study. This finding is supported by previous studies which have suggested that effective communication between healthcare providers and parents is crucial in addressing vaccine hesitancy [40] and [41].

The results revealed that respondents with a first child had higher vaccine hesitancy than those with other children. This finding is consistent with previous research that has reported that first-time parents are more likely to be vaccine-hesitant than parents with more than one child [42]. Thus, there is a need for targeted strategies to address vaccine hesitancy among first-time parents. Although the association between income and hesitancy was not statistically significant, previous studies have reported mixed results regarding the association between family income and vaccine hesitancy.

However, the study found a statistically significant association between educational level and vaccine hesitancy. Respondents with a secondary school education showed a higher percentage of vaccine hesitancy than those with a university degree. This result aligns with previous studies that reported a negative correlation between educational level and vaccine hesitancy [43].

The belief that it is better for children to build immunity through natural infection has decreased from a quarter of the parents in a previous study [44] to 11.7% in this study. It is concerning that despite the overwhelming evidence that vaccines are safe and effective, some parents continue to hold misconceptions and hesitations toward vaccination.

As important as the MCV is for disease prevention, side effects which range from mild to severe have been reported during measles vaccination campaign in Ebonyi State. (Ebonyi State Measles Campaign Call-in data, 2023). THL (2024), on contraindications for

MMR vaccination listed; Fever, suspected allergic reaction, Pregnancy and breastfeeding, Illness or medication that weakens the immune system Immunoglobulin treatment or transfusion, Thrombocytopenia, or low platelet count, as a contraindication to an MMR vaccination. These are in perfect agreement with those mentioned by participants during the FGDs. It was however said that the above listed are not absolute contraindications to further vaccinations. Caution should however be applied to ensure that the benefits of the protection afforded by the vaccination against measles and rubella are greater than the risk of thrombocytopenia reoccurrence. (THL,2024) The risk of coming down with thrombocytopenia caused by rubella or measles pathogens is said to be at least, ten times as high as the risk of developing thrombocytopenia resulting from the MMR vaccine.

Conclusion

The study participants' knowledge and perception of factors affecting uptake of MCV2 among under 5 children in Ebonyi State is consistent with evidence produced by other studies on the subject matter. The role of knowledge on the uptake of MCV 2 stood out in the discussions.

Participants, responding to the follow-up question of what they can do by themselves to mitigate the challenges as well as caregivers' reasons for defaulting, to ensure good immunization coverage, suggested; Changing the time of giving the incentive (ITN) to the caregivers from 9 months to 15 months, after the second dose is taken; Factoring engagement of adhoc health workers into their Business Plans to address inadequate human resource for health; Being more deliberate in health-educating mothers and caregivers on the need to take up a second dose of MCV 2 to have the child fully immunized; Employing the use of the Tickler System to remind caregivers of their immunization appointments

and to track defaulters; and Periodic baby tracking and intensification of routine immunization targeting settlements with a higher number of defaulters.

Conflict of Interest

The authors declare that there are no commercial or financial relationships that could be construed as a potential conflict of interest, while the research was conducted.

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