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Maternal satisfaction towards childhood immunization services and its associated factors among children caregivers, in a public health facility at Gondar town, Northwest Ethiopia, 2022

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Background: Immunization prevents over 4-6 million deaths each year worldwide. Ensuring mother satisfaction is an important means of preventing the death of children caused by communicable diseases. However, in Ethiopia, there is paucity of evidence on maternal satisfaction with immunization services. Thus, this study is aimed at assessing the level of maternal satisfaction with childhood immunization services and associated factors among children's caregivers.

Methods: A facility-based cross-sectional study was conducted among 556 systematically selected children's caregivers in public health facilities at Gondar Town from May through June, 2022. Data were collected using a pretested structured questionnaire. P≤ 0.25 during the bivariate binary logistic regression analysis was included in the multivariate analysis. From the multivariable analysis, variables with p ≤ 0.05 were declared statistically significant.

Results: The prevalence of maternal satisfaction towards childhood immunization services was 69.3%(95%CI: 65.5, 73.1%). Of mothers, 45.3% had adequate knowledge, while 43.9% had favorable attitude. Mothers 19-24 years old [AOR = 5.29; 95%CI:2.58,10.86], mothers who waited less than one hour [AOR = 3.03; 95%CI: 1.92,4.77], mothers less than thirty minutes waiting in health facility[AOR=1.98;95%CI:1.24,3.15], mother feel happy during service[AOR=4.00; 95%CI: 2.53,6.34], mothers adequate knowledge [AOR=2.91; 95%CI: 1.79, 4.73] and had favorable attitude [AOR=3.64; 95%CI: 2.25, 5.91] were significantly associated with maternal satisfaction during childhood immunization services.

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Conclusions: The overall level of mothers' satisfaction with childhood immunization services was considerably lower as compared with other studies. Thus, the town health office and concerned stakeholders need more efforts to improve mothers' satisfaction with childhood immunization services.

Keywords: Maternal satisfaction, Gondar public health facility, Ethiopia

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1. Background

The Expanded Program on Immunization (EPI) was established by the World Health Organization (WHO) in 1974 to control vaccine-preventable diseases[1]. In Ethiopian, EPI program was launched in 1980 with the objective of achieving 100% immunization coverage for all children under two years old by 1990 [2]. Improvement has been documented with the introduction of new approaches known as Reaching Every District (RED) and Sustainable Outreach Services (SOS) for immunization in 2003. However, system-wide barriers related to geographic coverage still remain as gaps, requiring bridging approaches such as the Enhanced Outreach Strategy, even as the country moves towards a more equitable geographical coverage with construction and peripheral health facilities [3].

The Ethiopian Ministry of Health is collaborating with UNICEF and WHO to mobilized the resources to cover the cost of vaccines for BCG(Bacillus-Calmette-Guerin), TT(Tetanus Toxoid), 50% of Oral Poliomyelitis Vaccine (OPV) and injection materials for traditional vaccines, in addition to the salaries of healthcare professionals and technical support, cold chain equipment, transport equipment, and social mobilization since 2009 [4]. Healthcare professionals play a central and critical role in improving access to EPI services for the population. This, EPI services focus has been on preventing communicable diseases, common nutritional disorders, environmental health and hygiene, and ensuring the safety and quality of EPI services among child caregivers living in Ethiopia [5].

Child immunization is one of the most successful and cost-effective global health interventions for reducing worldwide child illness, lifetime disabilities, and death by strengthening immunity. It is also the most powerful of all preventive health measures for children and it is central to human rights and poverty alleviation[6]. The ultimate goal of EPI services is to reduce the incidence of vaccine-preventable diseases (VPD) in children by attaining high levels of coverage with potent vaccines administered at the appropriate ages at the right intervals between doses for multiple-dose vaccines[7]. As a result, WHO recommended that all countries have established national immunization programs, and provide standard services for under-five years old children[8]. However, still now challenges over the last decade, there has been an increasing effort to address the discrepancies between the EPI services and client needs for quality of services [9]. Despite the international emphasis to address the unmet health needs of quality of services in reducing child mortality, maternal/caregivers' satisfaction has been slow. Since client satisfaction is a fundamental component of health service and is directly related to the utilization

of health services and it is the extent to which clients feel that their needs and expectations are being met by the services provided [10].

Maternal satisfaction is one of the most frequently used outcome measures for assuring quality of services, and it needs to be addressed to improve the quality and efficiency of health care service provision within the health care delivery system. It provides important feedback on how the service is functioning according to clients' perception and what changes might be required to meet clients' expectations[11, 12]. Without addressing maternal satisfaction during routine immunization services, coverage in Ethiopia has never reached the targeted figures and planned in sustainable improvement goals[13] because it emphasizes ensuring patient satisfaction as a means of secondary prevention of maternal mortality since satisfied women may be more likely to adhere to healthcare providers' recommendations [14].

Different reports find out that maternal satisfaction with EPI services plays a key role in improving the quality of immunization services and ultimately will enhance their cover ages[15]. For instance, the level of perceived satisfaction among mothers/caregivers attending health care delivery institutions is an important measure to ensure the quality of EPI services and the quality of health care at large [16]. The quality of EPI services in the health sector is generally categorized as including service structure, process and outcome [17]. Since quality assurance activities that assess child caregiver satisfaction with care may have added value in identifying children who are less likely to receive timely preventive services [18]. Mothers/caregivers of children who are satisfied with the healthcare service are more likely to develop a deeper and long-lasting relationship with the quality of EPI services, leading to improved compliance, continuity of care, and ultimately better health care outcomes [19]. Satisfaction is a general psychological condition that results from emotional surrounding expectations and it improves clinical outcomes and patient retention and reduces EPI malpractice suits[20]. Efficient and client-centered delivery of quality of healthcare is of utmost importance[21]. Thus, patient satisfaction, though a proxy is a very effective indicator to measure the success of health outcomes and plays a key role in improving health service quality [22].

Globally, almost 3 million children died by vaccine-preventable infectious diseases and every year, around 2 million children in developing countries die before they reach to their fifth year birthday; many during the first year of life [23]. When compared with chidden Western Europe,

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an Ethiopian child is 30 times more likely to die by his or her fifth-year birthday [24]. In Sub-Saharan African countries, a substantial number of child deaths (4.4 million) is attributed to inadequate immunization coverage and challenges every year due to communicable diseases that can be prevented by immunization [25]. The goal of universal childhood immunization has largely remained unrealized despite different efforts, which have resulted in an estimated 472,000 children still dying each year before their fifth birthday largely from vaccine preventable diseases [26]. In Ethiopia, current national immunization coverage is 76%, which is far from 100% national goal of 2020[2].

Several interventions made to solve this problem were also considered to strengthen immunization coverage in Ethiopia. Of them, expansion of primary healthcare services, implementation of an integrated health extension package, and training of front-line health extension workers are the major interventions[27]. However, regardless of the above interventions, immunization coverage in many parts of the country is still found to be less than desired [28] and quality of EPI service coverage in many parts of the country is still found to be less than what was expected from the EPI program [19]. According to the Ethiopian Mini Demographic and Health Survey (EDHS) report, in 2019, close to two in every five children aged 12–23 months (39%) received all their basic vaccinations at some time, only 22% were vaccinated at the appropriate age, and about 16% of children have not received any vaccinations[29].

Recently, efforts have been made on the importance of maternal satisfaction for the successful provision of childhood immunization services and some interventions are also under way to improve maternal satisfaction, like ensuring an uninterrupted supply of vaccines and associated logistics, improving the service process system, and training and education on childhood immunization[30, 31]. Though some community- based- evidences are available concerning the coverage of EPI services, there is still a paucity of evidence on its maternal satisfaction towards childhood immunization in healthcare facilities, particularly in the study area. It is a fact that increased maternal satisfaction with immunization services will increase the immunization coverage in the service area and in the country as a whole. Moreover, identifying factors associated with maternal satisfaction towards childhood immunization is crucial for the adherence of mothers to the service and thereby attaining the intended control of vaccine-preventable diseases. Therefore, this study is aimed at assessing the level of the maternal

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satisfaction towards childhood immunization services and its associated factors at Gondar town public health facility, Northwest Ethiopia.

Materials and methods

Study area and design. A facility-based cross-sectional study design was conducted from May to June, 2022. The study was conducted in Gondar town, one of the 26 woreda found in the Central Gondar zone, Northwest Ethiopia. Gondar is the capital city of Central Gondar zone, located at 748 km north of Addis Ababa. There are nine public health institutions in Gondar town. There are one comprehensive referral hospital, eight health center, 6 health posts, 12 junior private clinics, 7 medium private clinics. According to the Gondar town health administration office report, the average number of clients visiting the facility for EPI services is 150-170 per day with an estimated number of childhood immunization services clients visiting the facility per month 1910-2540.

Sampling technique and procedure: A two-stage probability sampling procedure was used to select participating mothers. First, we randomly selected 6(66.6%) health institutions for the study from nine health institutions at Gondar town. Then, in the second stage of sampling, all mothers whose children were less than one year old and present in the selected health facilities were interviewed. The total number of mothers whose children's age is less than one year in each health facility was calculated based on a proportional to the number of mothers followed at the health facilities in the last three months. The sampling interval (K^{th} value) was determined by dividing the total estimated mothers whose child age is less than one year number in each health facility by the calculated sample size. Finally, data were collected from every other woman whose child age is less than one year in those health facilities till the required sample size was reached. The event the presence of more than one eligible mother per health institution, the mother with the youngest child was selected randomly.

Sources population

All mothers/caretakers whose children's age is less than one year and who visited the health facility for childhood immunization service at Gondar town public health facilities were considered as the source population.

Study population

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All mothers/caretakers whose children's age is less than one year and who visited health facilities for childhood immunization service during the data collection period at Gondar town public health facilities were considered as the study population.

Inclusion and exclusion criteria

Inclusion criteria

All mothers/caretakers whose children's age is less than one year and who visited the health facility for childhood immunization services at Gondar town public health institutions during the time of data collection were included in the study.

Exclusion criteria

Mothers who were unable to hear or seriously ill during the interview were excluded in our study. Mothers with children referred from other health facilities for other health care services and those not having immunization follow up in Gondar town public health institutions and mothers coming to the health facility for campaign catch-up immunization were also excluded in our study.

Operational definitions

Maternal knowledge about childhood immunization services was measured using nine questions related to childhood immunization. Each correct answer was given a point of one [1] and zero (0) point was given to the incorrect ones. Those who scored mean and less than mean value were categorized as having inadequate knowledge and those who scored above mean were categorized as having adequate knowledge. Also, attitude towards childhood immunization service was assessed from six questions rated on a five-point Likert scales as [1] strongly disagree, [2] disagree, [3] neutral, [4] agree, and [5] strongly agree. For the purpose of ease of analysis, attitude of mothers towards child immunization service items were condensed (agree, and strongly agree) into two categories as "agree", and (strongly disagree, disagree, and neutral) to "disagree". Then, those who responded below the mean were considered to have an unfavorable attitude and those who scored mean and above were considered to a favorable attitude.

Maternal satisfaction towards childhood immunization services was measured using 21 satisfaction-related items categorized into health workers' relationships, attitude and communication (11 items), physical environment (6 items), and immunization system (4 items). Each tool used to measure satisfaction is rated on a 5-point Likert scale response (i.e., very dissatisfied, 2 dissatisfied, 3 neutral, 4 satisfied, and 5 very satisfied). First, the overall maternal

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satisfaction level was computed by adding the mean score of 21 satisfaction measuring items. Then, the threshold score for satisfaction was determined using the demarcation threshold formula, which is sptotal highest score-total lowest score/2 + total lowest score. Finally, mothers' overall satisfaction was categorized and dichotomized into "satisfied" and "not satisfied"[11, 19, 22, 32].

Based on this, mothers who scored above 69% on the satisfaction measurement tool were considered "satisfied", whereas mothers who scored ≤69% on the satisfaction measurement tool were considered "dissatisfied" towards childhood immunization services.

Sample size determination

The sample size (n) is calculated by considering a single population proportion formula by considering the following assumptions; 95% confidence interval; the proportion of maternal satisfaction towards childhood immunization(p=68.2%) taken from previous research conducted in Wadla District, North Wollo, Ethiopia [33]; $Z_{a/2}$ = 1.96 with d = 5% which is the margin of error.

By assuming a 10% non-response rate, the total sample size becomes 370.5. Finally, by using a design effect of 1.5, it becomes 556 mothers.

$$n = \frac{(Z_{a/2})^2 \text{ x P x (1-P)}}{d^2} = \frac{(1.96)^2 \text{ x } 0.68 \text{ x } (1 - 0.68)}{(0.05)^2} = 335$$

The sample size is also calculated using factors associated with determinants of maternal satisfaction with immunization service, by taking variables like divorced marital status (AOR = 0.51), secondary education (AOR = 0.65), favorable attitude (AOR = 1.75), and waiting time (AOR = 0.65), greeting/welcoming approach (AOR = 9.63) and information about the current vaccine (AOR=5.26) which showed statistically significant association with maternal satisfaction [22]. But, the sample size calculated using a single population proportion (i.e., proportion of maternal satisfaction) was found to be larger than the predictors. Based on this, the sample size resulted from the single population proportion formula (i.e. proportion of maternal satisfaction) where 556 were taken as a sample size for this study.

Data collection, management and quality assurance

A pre-test and structured questionnaire used for this study were developed by reviewing previous related studies after an extensive review of related literatures [34, 35] and after validated in the context of the local culture, language and others. The questionnaire was developed in English,

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then, translated into Amharic (the local language), and finally back to English to ensure consistency. A pre-test was conducted using a 5.0% sample size of the total study sample in Dabat health facility to establish the validity and reliability of the questionnaire. The questionnaire was amended based on the findings of the pre-test. The data collectors were trained to focus on the survey instrument, ethical approach to study participants. The data collectors were four BSc midwives as data collectors and administered face-to-face interviews with study participants.

Besides, the completeness and consistency of the questionnaires were reviewed and cross-checked for completeness and consistency by the supervisor, and all the necessary feedback was given to the data collectors immediately. Then, data were entered using Epi Data version 4.6. Once the data entry was completed, the data was exported to the Statistical Package of the Social Science (SPSS) version 23.0 for data cleaning and analysis. Basic data quality assurance measures were taken, including data cleaning using browsing of data tables after sorting, graphical exploration of distributions using box plots, histograms, and scatter plots, frequency distributions and cross tabulations, summary statistics and statistical outlier detection using sorting were performed. In addition to this, the reliability of the questionnaire was checked by Cronbach's alpha coefficient. Then Cronbach's alpha value was 0.831.

Descriptive statistics were used for categorical variables and mean ±SD (standard deviations) for continuous variables. Continuous variables were categorized using information from the literature and categorical variables were re-categorized accordingly.

Statistical analysis

Bivariate (crude odds ratio [COR]) and multivariable (adjusted odds ratio [AOR]) values were calculated using logistic regression analysis with a 95% confidence interval [CI]. From the bivariate analysis, variables with $p < 0.25$ were candidates for multivariable analysis. From the multivariable logistic regression analysis, variables with a significance level of $p < 0.05$ were taken as statistically significant and independently associated with willingness for blood donation. The presence of multi-collinearity among independent variables was checked using standard error at the cutoff value of 2, and we found a maximum standard error of 1.0, which indicated no multi-collinearity. The Hosmer-Lemeshow goodness of fit test was used to check for model fitness by looking at the cut-point p-value of > 0.05, which had 0.721.

Ethical approval and consent to participate: Ethical approval was obtained from the Ethical Review Committee of the School of Medicine University of Gondar prior to data collection with

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ethical letter protocol number: EIR/901/02/2022. After an official letter had been submitted to Gondar town health department's office, permission letters were collected/ obtained from Gondar town health department's office. The respondents were also informed that they have the full right to withdraw or refuse at any time from the process. Confidentiality of information given by each respondent was kept properly and anonymity was explained clearly for the participants.

Results

Socio-demographic characteristics of participants

A total of 554 participants were involved in the study giving a response rate of 99.6 %. The mean age of mother or caregiver was 28.42 with SD of 6.71 years old. More than two-thirds (83.8%) of the mothers or caregivers who participated in this study lived in urban dowers. Over 56.7% of the respondents were orthodox Christian by their religions, and majority, 448 (80%) of them were married. More than half of the study participants had three or more number of children.

Regarding respondents' education status, one-thirds (30.5%) of the mothers had a diploma and above education background and about half of the participants, (35.6%) were housewives followed by government-employed servants 129 (23.3%)(

Table 1).

Table 1: Socio-demographic characteristics of participants in public health facility at Gondar town Northwest, Ethiopia, may to June 2022

Variables	Frequency (n)	Percent (%)
Age of mothers		
19-24	137	24.7
25-30	274	49.5
≥31	143	25.8
Residence		
Urban	464	83.8
Rural	90	16.2
Religion		
Orthodox	314	56.7

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Muslim	130	23.5
Protestant	88	15.9
Catholic	22	4.0
Marital status		
Married	448	80.9
Single	53	9.6
Divorced	26	47
Widowed	27	4.9
Educational status		
No formal education	118	21.3
Primary level	126	22.4
Secondary level	143	25.8
Diploma and above	169	30.5
Maternal occupation		
Housewife	197	35.6
Civil servant	123	23.3
Private	103	18.6
Merchant	99	17.9
Student	26	4.9
Number of child		
≤3	256	46.2
>3	298	53.8
Family monthly income (mean)		
<5902.69	229	41.3.3
≥5902.69	325	58.7

Access and process to immunization services

Access and process-related factors to childhood immunization services were also assessed using different items. Based on this, more than two-thirds (73.8%) of study participants visited two or more health facility for immunization services. Regarding current immunization services, 343(619%) of study participants came to health facilities by vehicle as their means of transportation. Regarding service access waiting time, 295 (53.2%) mothers reported that they

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waited for more than thirty minutes while 193(34.85) used more than one hour to get a health facility for immunization services. Of the total respondents, 450(81.2%) of mothers/caretakers had information about the current vaccine. Finally, 461(83.2%) of mothers/caretakers didn't know the side-effect vaccine (Table 2).

Table 2: Access and process-related immunization services factors for mothers at Gondar public health, Northeast Ethiopia, May to June 2022 (*n* = 554)

Variables	Frequency	Percent
Faced any health problem after taking vaccination		
Yes	87	15.7
No	406	73.3
I don't remember	61	11.0
Frequency visited health facility for vaccination services		
More than 3 times	409	73.8%
Less than 2 times	145	26.2
How long time it takes to go to the health facility?		
≥60 minute	361	65.2
<60 minute	193	34.8
Waiting time in the hospital to get the vaccine?		
≥30 minute	295	53.2
<30 minute	259	46.8
Means of transportation to the health facility		
On foot	211	38.1
By vehicle	346	61.9
Are you happy when your child got a vaccine?		
Yes	379	68.4
No	175	31.6
Did the health worker greet you?		
Yes	431	77.8
No	123	22.2
Are you given information about the current vaccine?		
Yes	450	81.2
No	104	18.8

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Are you given information about the type of the vaccine your child taken?		
Yes	408	73.6
No	146	26.4
Are you given information about the next dose of the vaccine your child will be taken?		
Yes	194	35.0
No	360	65.0
Are you given information about the ell you the next immunization schedule?		
Yes	393	70.9
No	161	29.1
Did you see side-effect on your child develop after vaccination?		
Yes	93	16.8
No	461	83.2

Knowledge of mothers about childhood immunization services

Out of the total study participants, 251 (45.3%) had adequate knowledge, while 303 (54.7%) had inadequate knowledge about childhood immunization. Among the result of knowledge assessment items showed that nearly two-thirds of the respondents (73.3%) were aware of EPI target diseases and about 488 (88.1%) had information about next vaccination schedule(Table 3).

Table 3: Knowledge of mothers about childhood immunization services at Gondar public health facilities, Northeast Ethiopia, may to June 2022 (*n* = 554)

Variables	**Frequency**	**Percent**
Do you know the EPI targeted diseases?		
Yes	406	73.3
No	148	26.7
Which type of diseases that vaccine can prevent?		
Infectious diseases	457	82.5
Non-communicable diseases	74	13.4
Evil sprits	23	4.2
Is it necessary to vaccinate breast feeding child?		
Yes	499	90.9
No	55	9.1
Do you know that that vaccination is not harmful		
Yes	403	72.7
No	151	27.3
Did you know the next vaccination schedule of your child		

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Yes No	488 66	88.1 11.9
Did you know about the side effects of EPI vaccines?		
Yes No	355 199	64.1 35.9
Did you fever side-effects in children vaccines? (n=355)	211	38.1
Yes No	297 58	83.7 16.3
Did you diarrhea side-effects in children vaccines? (n=355)		
Yes No	180 175	50.7 49.3
Did you vomiting side-effects in children vaccines? (n=355)		
Yes No	157 198	44.2 55.8
Did you un able to feeding side-effects in children vaccines? (n=355)		
Yes No	209 146	58.9 41.1
Did know child face any health problem after taking vaccination?		
Yes No I don't know	87 406 61	15.7 73.3 11.0

Maternal attitude about childhood immunization services

Out of the total study participants, merely (43.9%) of the respondents had a favorable attitude towards childhood immunization services. Among respondents, 468 (84.5%) believed that compliance with the immunization schedule is important. Majority, 486(87.7%) of the study participants believed that vaccination is beneficial for the wellbeing of their children. Most, 424 (76.6%) of the study participants were presume to believe that vaccination makes infants sick and 463(83.6%) of the study participants did not believe that, it could bring the infants even to death (Table 4).

Table 4: Attitude of mothers towards childhood immunization services at Gondar public health facilities, Northeast Ethiopia, may to June 2022 (*n* = 554)

Variables	Strongly disagree n(%)	Disagree n(%)	Neutral n (%)	Agree n(%)	Strongly agree n(%)
Compliance to immunization schedule is important	14(2.5)	14(2.5)	58(10.5)	339(61.2	129(23.3

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Vaccination is beneficial for the wellbeing of your children	12(2.2)	23(4.2)	33(6.0	344(62.1)	142(25.6)
Vaccination makes infants sick	79(14.3)	281(50.7)	64(11.6)	67(12.1	63(11.4)
Vaccination could bring the infants to death	77(12.9)	259(46.8)	127(22.9)	65(11.7)	26(4.7)
Did you belief vaccine protect all infection disease?	9(1.6)	18(3.2)	66(11.9)	332(59.9)	129(23.3)
Did you think vaccine protect infection disease than political implication?	81(11.6)	280(50.5)	65912.70	679(11.1)	61(11.0)

Maternal satisfaction towards childhood vaccine service

Maternal satisfaction towards childhood immunization was measured using 21 satisfaction-related items categorized into health workers' relationships, attitude and communication, physical environment, and immunization system. Finally, the overall satisfaction was computed by adding the mean score of the 21 satisfaction items. The maximum total satisfaction score was 500, and the minimum score was found to be 100. The threshold score for satisfaction was determined using the demarcation threshold formula, which is (ptotal highest score - total lowest score)/2 + total lowest score. Accordingly, the finding showed that the threshold value for the maternal satisfaction was found to be 300. Based on this, the overall prevalence of maternal satisfaction towards childhood immunization service was 69.3% (95%CI: 65.5, 73.1%).

Factors associated with maternal satisfaction during childhood immunization service

Our results indicate that after adjusting for confounding variables from multivariable logistic regression analysis, maternal satisfaction towards childhood immunization service. According to this, mothers aged who belong to 19-24 years olds were 5.29 times more likely to be satisfaction with childhood immunization service[AOR = 5.29; 95% CI:2.58,10.86) compared to participants who were aged over 31 years old.

The odds of maternal satisfaction in childhood immunization services was 3.03 times (AOR = 3.03; 95; 95%CI: 1.92,4.77) higher for participants who used less than one hour to get childhood immunization services than those that used more than one hour to get childhood immunization services. Similarly, the odds of satisfaction among mothers with less than thirty minutes of waiting time in a health facility to get childhood immunization services were 1.98 times higher

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than those participants waiting more time in a health facility to get childhood immunization services (AOR = 1.98; 95% CI: 1.24, 3.15).

The odds of developing maternal satisfaction were 4.00 times higher in participants who feel happy during childhood immunization services than in participants not feel happy during childhood immunization services (AOR = 4.00; 95%CI: 2.53,6.34). Those with adequate knowledge were 2.91 times more likely to be maternal satisfaction compared to those with inadequate knowledge (AOR=2.91, 95%CI: 1.79, 4.73) and participants who had favorable attitude toward childhood immunization service were 3.64 times more likely to be maternal satisfaction by giving childhood immunization service compared to those with an unfavorable attitude (AOR=3.64, 95%CI: 2.25, 5.91) (Table 5).

Table 5: Bivariate and multivariable logistic regression analysis of factors associated with maternal satisfaction towards childhood immunization service at Gondar town public health facility, Northwest Ethiopia, May to June 2022

Variables	Maternal satisfaction		COR (95% CI)	AOR(95% CI)	P-value
	Satisfied	Not satisfied			
Mathrenal age(years)					
19-24	117	20	3.55(1.98,6.36)	5.29(2.58,10.86)	.000
25-30	178	96	1.13(0.70,0.71)	1.06(0.63,1.78)	.819
≥31	89	54	1:00	1:00	
Maternal education					
No formal education	83	35	1:00	1:00	.029
Primary level	78	46	0.72(0.42,1.22)	0.60(0.31,1.18)	.139
Secondary level	101	42	1.04(0.60,1.73)	0.52(0.27,1.03)	.062
Diploma and above	122	47	1.11(0.65,1.84)	0.95(0.49,1.83)	.870
Family income (by mean)					
≤5920.68	146	83	1:00	1:00	
>5920.69	238	87	1.55(1.08,2.24)	1.20(075,1.92)	.441
Frequency visited health facility for services					
More than 3 times	293	145	1.81(1.11,2.93)	1.11(0.65,1.87)	.731
Less than 2 times	91	25	1.00	1.00	

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Time taken to get childhood immunization services					
≥60 minutes	284	77	1:00	1.00	
<60 minutes	100	93	3.43((2.35,5.01)	3.03(1.92,4.77)	.000
Waiting time to get childhood immunization services					
≥30 minutes	184	111	1:00	1:00	
<30 minutes	200	59	2.05(1.47,2.97)	1.98(1.24,3.15)	.004
Happy during childhood immunization services					
Yes	302	77	4.45(3.02,6.56)	4.00(2.53,6.34)	.000
No	82	93	1:00	1:00	
Information given about the current vaccine					
Yes	326	124	2.09(1.35,3.23)	1.65(0.84,3.24)	.149
No	58	46	1:00	1.00	
Information given about the current vaccine type					
Yes	296	112	1.74(1.17,2.59)	1.66(0.91,3.11)	.058
No	88	58	1.00	1.00	
Information given about the current vaccine					
Yes	129	65	0.81(0.56,1.190	0.63(0.38,1.040)	.070
No	255	105	1:00	1:00	
Knowledge about childhood immunization services					
Good	198	53	3.56(1.61,3.44)	2.91(1.79,4.73)	.000
Poor	186	117	1:00	1:00	
Attitude about childhood immunization services					
Favorable	193	50	2.43(1.65,3.57	3.64(2.25,5.91)	.000
Unfavorable	191	120	1.00	1.00	

Discussion

Maternal satisfaction towards childhood immunization services is an important indicator for measuring the quality of childhood immunization services in health institutions. Therefore, we investigated the prevalence of satisfaction and its associated factors among mothers for childhood immunization services at public health facility at Gondar Ethiopia. We found the prevalence of maternal satisfaction to be 69.3%. The study also revealed that mothers aged 19-24 years old, participants who used less than one hour to get childhood immunization services,

mothers who waited less than thirty minutes in a health facility to get childhood immunization services, mothers who felt happy during childhood immunization services taken, mothers who had adequate knowledge and favorable attitude were factors significantly associated with satisfaction among mothers during childhood immunization services.

This rate of mother satisfaction in our study was lower than studies conducted in Egypt (95.2%)[19],in Nigeria(84.5%)[36], Shenen Dugo District, Oromia Regional State, Eastern Ethiopia(79.1%)[37], and Dawie Harewa District, Northeast Ethiopia (84.65%) [38]. This discrepancy might be due to the differences in the method of computing the estimate of satisfaction. In this study, the prevalence of maternal satisfaction was estimated using the demarcation threshold formula. However, the former studies estimated the prevalence of maternal satisfaction based on the global measure assessment tool, mean and median of the data set, respectively. The other possible reason for this difference might be lower socio-demographic status of the study areas. For instance, the level of maternal education helps mothers understand the services provided and seek better-satisfied health services. In this study, only 27.1% of mothers had secondary education, whereas 63.8% of mothers living in rural areas who frequency visited primary health facilities for immunization services had secondary education in the former study.

However, this rate was in line with the prevalence of maternal satisfaction reported by a study conducted in the South Wollo Amhara Region of Ethiopia (71.9%) [39]. This might be due to similarities in the socio-demographic status of town dwellers in Amhara Region Ethiopia.

In our findings, mothers' age those belong to 19-24 years were 5.29 times more likely satisfaction on the childhood immunization service compared to than participants who have age above 31 years old. This finding is supported by study in Este Town in Eastern Ethiopia[40]. The similarity might be due to youth age groups mothers are more understand what is respected quality of care during child immunization service.

In this study, participants who used less than one hour time taken to get childhood immunization services compared to those used more than one hour time taken to get childhood immunization services. This finding is consistent with those of study conducted in North Wollo, Ethiopia[39]. Similarly, our data revealed that shorter service waiting time (i.e., less than thirty minutes) to get vaccination was another significant predictor for maternal satisfaction towards childhood immunization service. The result is in line with the study finding from Jigjiga[40] of Ethiopia, in North Wollo, Ethiopia [39], and Nigeria[41].

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The finding of the current study also revealed that greeting/welcoming approach by health care providers had a positive effect on the level of maternal satisfaction towards childhood immunization services. Mothers who got greetings were 4.0 times more likely satisfied than mothers who did not got greetings/welcoming approach. Effective interaction between health care providers and clients can address the concerns of vaccine supportive parents and motivate a hesitant parent towards vaccine acceptance. In addition to this, good communication between clients and care-providers has been also described as the single most important component of good medical practice[42].

Those with adequate knowledge were 2.91 times more likely to be maternal satisfaction compared to those with inadequate knowledge and participants who have favorable attitude toward childhood immunization service were 3.64 times more likely to be maternal satisfaction by giving childhood immunization service compared to those with a unfavorable attitude. This can be explained by the fact that those who had adequate knowledge and favorable attitude toward childhood immunization service could understand the benefit of immunization service for those in need. This association might be observed due to the knowledge of the vaccine help the mothers to develop a sense of protecting their children from a certain type communicable diseases. This finding was coherent with a finding obtained in southwest Ethiopia[43].

Strength and limitation of the study

Utilization of an institutional-based data collection method with valid and standardized instruments could be the strength of the current study. This study cannot ascertain a cause and effect relationship since it is a cross-sectional type, recall bias cannot be a totally eliminated, and absence of qualitative study to strengthen the quantitative data could be mentioned as a potential limitation of the current study.

Conclusion and recommendation

The overall level of mothers' satisfaction with childhood immunization services was considerably lower as compared with other studies. Thus, it is recommended that more efforts need to be put towards improving the mother's satisfaction with care like; 19-24 year old mothers, participants who used less than one hour to get childhood immunization service, mothers who waited less than thirty minutes in health facility to get childhood immunization services, mothers who felt happy during childhood immunization services , mothers who had adequate knowledge and favorable attitude factors were significantly associated with satisfaction among mothers during childhood immunization service.

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It is also recommended that the district health office department, together with the health care providers in the district should plan a regular outreach campaign activity to advance mothers' awareness and attitude towards childhood immunization by focusing on the importance of vaccination. Furthermore, it is necessary to improve the accessibility of general care offered at the units, particularly the service waiting time, long time taken and greeting/welcoming approach of the healthcare providers in the health institutions.

List of abbreviations/acronyms

BCG: Bacillus- Calmette Guerin

EPI: Expanded Program on Immunization

OPV: Oral Poliomyelitis Vaccine

RED: Reaching Every District

SOS: Sustainable Outreach Services

SPSS: Statistical Packages for Social Sciences

TT: Tetanus Toxoid

UNICEF: United Nations Children's Fund

WHO: World Health Organization

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Availability of data and materials

The data sets used and/or analyzed during this study are available from the corresponding authors on reasonable request.

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