

Levels and Associated Factors of Clients' Satisfaction Toward Child Immunization at Grassroot Health Care Centers in Ho Chi Minh City, Vietnam

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Purpose: Immunization is the most cost-effective health strategy, contributing significantly to public health interventions for all ages, particularly for children. However, caregivers' satisfaction with immunization systems affects their decisions on immunization for their children. This study evaluated the levels of clients' satisfaction toward child immunization and to identify its associated factors.

Methods: A cross-sectional study was conducted at 40 commune health centers (CHCs) in 24 districts in Ho Chi Minh City, Vietnam among 1200 caregivers of children aged under 5 years. Clients who took their children to CHCs for immunization were recruited based on convenience sampling technique and were asked to complete a self-report questionnaire. Satisfaction was measured using the Satisfaction with Immunization Service Questionnaire (SWISQ). Ordinal logistic regression models were fitted to identify factors associated with satisfaction levels.

Results: The majority of participants were female (85.5%) with a mean age of 33.3 (standard deviation = 9.0). Approximately 60% of participants reported a moderate (40.2%) or high (17.1%) level of satisfaction. Participants with older children and those who waited for a longer duration had a lower satisfaction level. In contrast, high satisfaction level was found to be positive associated with being reminded by healthcare workers and the condition of follow-up areas, vaccine storage and the immunization process met participant's need.

Conclusion: The level of clients' satisfaction toward child immunization at grassroot healthcare centers in Ho Chi Minh City is relatively low, with 40.2% having moderate satisfaction and 17.1% having high satisfaction. Strategies to improve vaccination programs at CHCs are needed, focusing on clients' experiences at CHCs during vaccination sessions. Further studies are also needed to have an in-depth understanding of more factors affecting satisfaction in this population.

Keywords: service satisfaction, child immunization, community healthcare center, Vietnam

Introduction

Immunization is the most cost-effective health strategy, contributing significantly to public health interventions for all ages, particularly for children. Since the introduction of the Expanded Program on Immunization (EPI) launched by the World Health Organization (WHO) in 1974, child immunization plays a vital role in the prevention, elimination and eradication of life-threatening diseases, thereby reduces morbidity and mortality for children under-five years old.¹ However, the global immunization coverage has not met expectations and about 25 million children were either unvaccinated or under-vaccinated in some parts of the world in 2021.² This under-coverage rate is serious and can lead to the spread and return of eradicated infectious diseases, disability, deaths and compromise maternal and children's

wellbeing. The COVID-19 pandemic also contributes to the decline in immunization coverage with a drop of up to 9% in South-East Asian Region during 2020–2021.² In Vietnam, although the progressive success has been observed in immunization coverage of the EPI since 1981, the coverage rate is still low compared to other countries.³ Consequently, in the 2014 measles outbreak in Vietnam, there were 30,000 suspected cases, nearly 6000 confirmed cases and about 150 deaths.⁴

Several reasons for low immunization coverage and under-vaccination have been consistently reported in many countries such as low quality of health services and low level of satisfaction with immunization systems. An analysis from WHO has revealed that caregivers' satisfaction with immunization systems affects their decision on immunization for their children.⁵ Also, a high level of satisfaction helps improve adherence to immunization and increase the number of fully vaccinated children.⁶ However, satisfaction in child immunization system is still low in many countries. Several studies in African countries reported a prevalence of satisfaction of 61.1% - 82.7%.^{7–9} In Asia, this figure is about 95% in China,¹⁰ 90% in India,¹¹ 63–75% in Vietnam.^{12–14} Determinants of satisfaction have also been identified such as caregivers' characteristics,^{14,15} facility,^{11,12} or organization of immunization sessions.^{16,17} For example, a large body of literature has demonstrated that waiting time can contribute to clients' dissatisfaction where the lack of an appointment system and the long waiting time result in no return and thus a low rate of fully vaccinated children.^{15,16,18}

Ho Chi Minh City is a leading socio-economic center in Vietnam with 419 public immunization facilities in all catchment areas. However, only 60% of children in the city have access to the national EPI. It is possible that 40% of children in the city have no access to immunization or have access to private immunization services. These possibilities imply the under-trusted in the national EPI and public facilities. Notably, a study in 2018 found high proportions of under-vaccination,¹⁹ ranging from 18% to 36% and other studies indicated that up to 30% of children aged under two years did not comply with recommended schedule for basic vaccines.²⁰ The low immunization coverage rate can profoundly influence regional and national EPI's targets and can negatively impact children's wellbeing and community health. Although clients' satisfaction is associated with their utilization of immunization services and is considered an important indicator to evaluate the effectiveness of childhood immunization programs, to date there is a scarcity of studies in Ho Chi Minh City focusing on the extent of clients' satisfaction with childhood immunization service.

Therefore, this study evaluated the levels of clients' satisfaction toward child immunization and to identify its associated factors. Findings from this study can provide evidence for the maintenance or improvement of clients' satisfaction as well as for the suggestion of effective solutions to the management and organization in child immunization services, and ultimately ensure their wellbeing and development.

Methods

Settings and Study Design

During May to June 2020, a cross-sectional study was conducted among caregivers of children aged under 5 years who took their children to commune health centers (CHC) for immunization. The sample size was calculated based on the formula for one proportion estimation. With an estimated proportion of 0.63, the width of 95% confidence interval of 0.1 and the design effect of 3, at least 1074 participants were needed. In Ho Chi Minh City, there are 419 CHC in 24 districts and free immunization is provided for all children within the catchment areas. In this study, 40 CHC were randomly selected from a list of all CHC in all districts. Because under the EPI, all CHC have immunization services available, no specific criteria were applied to select the CHC. In a standard immunization session, children must be at the CHC and monitored for adverse events for at least 30 minutes after the immunization. At each CHC, 30 caregivers were recruited during their 30-minute waiting time based on convenience sampling technique, resulting in a total sample of 1200 caregivers.

Measurement

Data were collected through a self-report questionnaire which included four parts. The first part included information about demographic characteristics such as gender, age, relationship with the children, living location, education level, occupation and economic status. The second part of the questionnaire included questions about caregivers' experiences prior to the current immunization session, such as the number of times they had gone to CHC and the number of times they had had immunization at the CHC. The third part had questions about their experiences during the current immunization session, such as distance from home to CHC, waiting time, evaluation of facilities and procedures involved. The fourth part was the Satisfaction with Immunization Service Questionnaire (SWISQ)²¹ to evaluate their satisfaction level. The scale has 19 questions evaluating 3 aspects including organization/interface with practice (5 items), consultation experience (12 items) and listening/respecting decisions (2 items). Each question in the SWISQ is rated based on a Likert-type rating scale from 1 (very satisfied) to 5 (very dissatisfied). The total score ranges from 19 to 95. In Vietnam, the SWISQ was translated, validated and used in a previous study.²² The psychometric properties of the original version and the Vietnamese version were good with high levels of reliability and validity.

Data Analysis

Based on practice in previous studies in analyzing Likert-type data, the total score of the SWISQ was transformed into a 0–100% scale by using the formula: (Mean score of all 19 items - 1) x 25.²¹ The transformed score was categorized into low satisfaction ($\leq 60\%$), mild satisfaction (61–70%), moderate satisfaction (71–80%) and high satisfaction ($>80\%$). This categorization was based on the widely adopted Bloom et al cutoffs. Chi-squared tests were used to compare satisfaction levels across participants' characteristics and experiences. Univariate and multiple ordinal logistic regression models were fitted to identify factors associated with satisfaction levels.

Ethical Consideration

This study was approved by the Ethics Committee for Biomedical Research at the University of Medicine and Pharmacy at Ho Chi Minh City (approval number: 141/HĐĐĐ). All participants provided written consent forms before their participation. The study was performed in accordance with the ethical standards stated in the Declaration of Helsinki.

Results

The majority of participants were female (85.5%) with a mean age of 33.3 (standard deviation = 9.0) (Table 1). Most participants were mothers (76.1%) of a 2–12-month-old child (57%), permanent residence in the city (51.0%), had at least high

Table 1 Participants' Characteristics and Their Association with Satisfaction Level (N=1200)

Characteristics	Total (n, %) ^a	Satisfaction Level (n, %) ^b				p ^c
		Low (n=136, 11.3%)	Mild (n=377, 31.4%)	Moderate (n=482, 40.2%)	High (n=205, 17.1%)	
Sex						
Female	1026 (85.5)	115 (11.2)	325 (31.7)	415 (40.4)	171 (16.7)	0.766
Male	174 (14.5)	21 (12.1)	52 (29.9)	67 (38.5)	34 (19.5)	
Age (year)						
<25	142 (11.8)	10 (7.0)	48 (33.8)	58 (40.9)	26 (18.3)	0.901
25–29	285 (23.8)	31 (10.9)	87 (30.5)	117 (41.0)	50 (17.5)	
30–35	420 (35.0)	51 (12.1)	136 (32.4)	161 (38.4)	72 (17.1)	
36–40	182 (15.2)	21 (11.5)	58 (31.8)	74 (40.7)	29 (16.0)	
>40	171 (14.2)	23 (13.5)	48 (28.1)	72 (42.1)	28 (16.3)	
Relationship with the child						
Father	158 (13.2)	20 (12.7)	46 (29.1)	61 (38.6)	31 (19.6)	0.213
Mother	913 (76.1)	101 (11.1)	302 (33.1)	358 (39.2)	152 (16.6)	
Others	129 (10.7)	15 (11.6)	29 (22.4)	63 (48.8)	22 (17.0)	

(Continued)

Table 1 (Continued).

Characteristics	Total (n, %) ^a	Satisfaction Level (n, %) ^b				p ^c
		Low (n=136, 11.3%)	Mild (n=377, 31.4%)	Moderate (n=482, 40.2%)	High (n=205, 17.1%)	
Child's age (month)						
2–12	684 (57.0)	69 (9.9)	210 (30.7)	274 (40.1)	132 (19.3)	0.139
13–24	351 (29.3)	52 (14.8)	109 (31.0)	141 (40.2)	49 (14.0)	
>24 – 59	165 (13.7)	16 (9.7)	58 (35.2)	67 (40.6)	24 (14.5)	
Living in Ho Chi Minh City (N=1192)						
Permanent residence	608 (51.0)	65 (10.7)	171 (28.1)	252 (41.5)	120 (19.7)	0.076
>6 months	527 (44.2)	63 (11.9)	190 (36.1)	197 (37.4)	77 (14.6)	
≤6 months	57 (4.8)	8 (14.0)	14 (24.5)	29 (50.8)	6 (10.5)	
Educational level completed						
< Primary school	142 (11.9)	24 (16.9)	44 (31.0)	52 (36.6)	22 (15.5)	0.063
Secondary school	425 (35.4)	45 (10.6)	156 (36.7)	161 (37.9)	63 (14.8)	
High school	358 (29.8)	36 (10.1)	108 (30.2)	146 (40.8)	68 (18.9)	
>High school	275 (22.9)	31 (11.3)	69 (25.1)	123 (44.7)	52 (18.9)	
Occupation						
Worker	251 (20.9)	35 (13.9)	91 (36.3)	90 (35.9)	35 (13.9)	0.033
Office administrator	204 (17.0)	21 (10.3)	47 (23.0)	93 (45.6)	43 (21.1)	
Businessmen	147 (12.2)	17 (11.6)	44 (29.9)	49 (33.3)	37 (25.2)	
Housewife	470 (39.2)	54 (11.5)	151 (32.1)	191 (40.7)	74 (15.7)	
Others	128 (10.7)	9 (7.0)	44 (34.4)	59 (46.1)	16 (12.5)	
Number of children						
1	439 (36.6)	45 (10.3)	133 (30.3)	179 (40.8)	82 (18.6)	0.770
2	552 (46.0)	68 (12.3)	180 (32.6)	215 (39.0)	89 (16.1)	
≥ 3	209 (17.4)	23 (11.0)	64 (30.6)	88 (42.1)	34 (16.3)	
Economic status						
Normal	1117 (93.1)	130 (11.6)	351 (31.4)	453 (40.6)	183 (16.4)	0.144
Poor	83 (6.9)	6 (7.2)	26 (31.3)	29 (35.0)	22 (26.5)	

Notes: ^aColumn percentage; ^bRow percentage; ^cAdjusted for cluster effect.

school education (52.7%) and had two children or more (63.4%). Approximately 60% of participants reported a moderate (40.2%) or high (17.1%) level of satisfaction. There was no significant association between participant’s characteristics and satisfaction levels, except that those who were office administrators had a higher level of satisfaction (p=0.033).

About 80% of participants reported having gone to the healthcare center before (Table 2). About 45% of participants remembered immunization date thanks to the note on immunization booklet and 30% reported receiving reminders from

Table 2 Participants’ Experiences and Their Association with Satisfaction Level (N=1200)

Characteristics	Total (n, %) ^a	Satisfaction Level (n, %) ^b				p ^c
		Low (n=136, 11.3%)	Mild (n=377, 31.4%)	Moderate (n=482, 40.2%)	High (n=205, 17.1%)	
Number of times going to this healthcare center						
1st time	275 (22.9)	27 (9.8)	91 (33.1)	114 (41.5)	43 (14.6)	0.486
2nd time	207 (17.3)	23 (11.1)	63 (30.4)	76 (36.8)	45 (21.7)	
3rd time	125 (10.4)	11 (8.8)	33 (26.4)	59 (47.2)	22 (17.6)	
≥4th time	593 (49.4)	75 (12.7)	190 (32.0)	233 (39.3)	95 (16.0)	

(Continued)

Table 2 (Continued).

Characteristics	Total (n, %) ^a	Satisfaction Level (n, %) ^b				p ^c
		Low (n=136, 11.3%)	Mild (n=377, 31.4%)	Moderate (n=482, 40.2%)	High (n=205, 17.1%)	
Number of times having immunization at this healthcare center						
1st time	269 (22.4)	26 (9.7)	89 (33.1)	109 (40.5)	45 (16.7)	0.506
2nd time	214 (17.8)	20 (9.4)	67 (31.3)	82 (38.3)	45 (21.0)	
3rd time	138 (11.5)	12 (8.7)	41 (29.7)	64 (46.4)	21 (15.2)	
≥ 4th time	579 (48.5)	78 (13.5)	180 (31.1)	227 (39.2)	94 (16.2)	
How do you remember immunization date?						
Reminded by healthcare workers						
Yes	358 (29.8)	23 (6.4)	79 (22.1)	170 (47.5)	86 (24.0)	<0.001
No	842 (70.2)	113 (13.4)	298 (35.4)	312 (37.1)	119 (14.1)	
Reminded by friends or relatives						
Yes	48 (4.0)	4 (8.3)	18 (37.5)	18 (37.5)	8 (16.7)	0.757
No	1152 (96.0)	132 (11.4)	359 (31.2)	464 (40.3)	197 (17.1)	
Reminded by SMS from the system						
Yes	33 (2.7)	1 (3.0)	10 (30.3)	18 (54.6)	4 (12.1)	0.161
No	1167 (97.3)	135 (11.6)	367 (31.5)	464 (39.7)	201 (17.2)	
Remembered						
Yes	320 (26.6)	37 (11.6)	112 (35.0)	132 (41.2)	39 (12.2)	0.101
No	880 (73.4)	99 (11.3)	265 (30.1)	350 (39.8)	166 (18.8)	
Based on date noted on immunization booklet						
Yes	530 (44.1)	72 (13.6)	175 (33.0)	201 (37.9)	82 (15.5)	0.245
No	670 (55.9)	64 (9.5)	202 (30.2)	281 (41.9)	123 (18.4)	
Others						
Yes	208 (17.3)	32 (15.4)	65 (31.2)	80 (38.5)	31 (14.9)	0.271
No	992 (82.7)	104 (10.5)	312 (31.5)	402 (40.5)	174 (17.5)	

Notes: ^aColumn percentage; ^bRow percentage; ^cAdjusted for cluster effect.

healthcare workers. However, less than 3% were reminded by the SMS from the system. Those who received reminders from healthcare workers had significantly higher satisfaction levels ($p < 0.001$).

Half of participants were less than one kilometer away from the healthcare center and 60% waited for 30 minutes or less at the healthcare center (Table 3). The percentage of participants who reported that facilities at the healthcare center met their need ranged from 73.5% (vaccine storage) to 96.7% (examination area). Almost all participants revealed that immunization activities met their need. Significantly higher levels of satisfaction was found among those who had less waiting time or thought the facilities and immunization activities met their needs.

Significant factors with p values of less than 0.200 in Tables 1, 2 and 3 were analyzed using univariate and multiple ordinal logistic regression (Table 4). From the final model, participants with older children and those who waited for a longer duration had lower satisfaction levels. In contrast, high satisfaction levels were found to be positive associated with being reminded by healthcare workers and the condition of follow-up areas, vaccine storage and immunization process that met participant's needs. Living location, education, occupation and waiting time were significantly associated with satisfaction levels in univariate but were not significant in multiple analysis.

Table 3 Participants' Experiences at the Healthcare Center and Their Association with Satisfaction Level (N=1200)

Characteristics	Total (n, %) ^a	Satisfaction Level (n, %) ^b				p ^c
		Low (n=136, 11.3%)	Mild (n=377, 31.4%)	Moderate (n=482, 40.2%)	High (n=205, 17.1%)	
Distance from home to this healthcare center (km)						
≤1	627 (52.3)	71 (11.3)	211 (33.6)	239 (38.1)	106 (17.0)	0.482
>1 – 2	262 (21.8)	32 (12.2)	67 (25.6)	121 (46.2)	42 (16.0)	
>2 – 3	152 (12.7)	18 (11.8)	55 (36.2)	56 (36.8)	23 (15.2)	
>3	159 (13.2)	15 (9.4)	44 (27.7)	66 (41.5)	34 (21.4)	
Waiting time (minute)						
≤15	396 (33.0)	28 (7.1)	87 (22.0)	190 (47.9)	91 (23.0)	<0.001
16–30	361 (30.0)	32 (8.9)	135 (37.4)	152 (42.1)	42 (11.6)	
31–45	56 (5.0)	5 (8.9)	31 (55.4)	15 (26.8)	5 (8.9)	
46–60	251 (21.0)	46 (18.3)	83 (33.1)	82 (32.7)	40 (15.9)	
>60	136 (11.3)	25 (18.4)	41 (30.2)	43 (31.6)	27 (19.8)	
Do facilities at this healthcare center meet your need?						
Waiting area						
Yes	976 (81.3)	103 (10.6)	295 (30.2)	398 (40.8)	180 (18.4)	0.039
No	224 (18.7)	33 (14.7)	82 (36.6)	84 (37.5)	25 (11.2)	
Examination area						
Yes	1160 (96.7)	128 (11.0)	368 (31.7)	463 (40.0)	201 (17.3)	0.080
No	40 (3.3)	8 (20.0)	9 (22.5)	19 (47.5)	4 (10.0)	
Follow-up area						
Yes	1007 (83.9)	106 (10.5)	295 (29.3)	418 (41.5)	188 (18.7)	<0.001
No	193 (16.1)	30 (15.5)	82 (42.5)	64 (33.2)	17 (8.8)	
Vaccine storage						
Yes	882 (73.5)	71 (8.1)	269 (30.5)	369 (41.8)	173 (19.6)	<0.001
No	318 (26.5)	65 (20.4)	108 (34.0)	113 (35.5)	32 (10.1)	
Bathroom area (n=205)						
Yes	185 (90.2)	13 (7.0)	47 (25.4)	89 (48.1)	36 (19.5)	0.032
No	20 (9.8)	5 (25.0)	2 (10.0)	7 (35.0)	6 (30.0)	
Do immunization activities meet your need?						
Immunization process						
Yes	1186 (98.8)	131 (11.0)	372 (31.4)	480 (40.5)	203 (17.1)	0.015
No	14 (1.2)	5 (35.7)	5 (35.7)	2 (14.3)	2 (14.3)	
Immunization schedule						
Yes	1169 (97.4)	130 (11.1)	371 (31.7)	470 (40.2)	198 (17.0)	0.256
No	31 (2.6)	6 (19.3)	6 (19.4)	12 (38.7)	7 (22.6)	
Immunization time						
Yes	1178 (98.2)	132 (11.2)	372 (31.6)	474 (40.2)	200 (17.0)	0.607
No	22 (1.8)	4 (18.2)	5 (22.7)	8 (36.4)	5 (22.7)	

Notes: ^aColumn percentage; ^bRow percentage; ^cAdjusted for cluster effect.

Table 4 Univariate and Multiple Ordinal Logistic Regression on Factors Associated with Satisfaction Level (N=1200)

Characteristics	Crude ^a			Adjusted ^b		
	OR	p	95% CI	OR	p	95% CI
Living in Ho Chi Minh City						
Permanent residence	1			-		
>6 months	0.71	0.023	0.53–0.95			
≤6 months	0.80	0.426	0.46–1.39			
Educational level completed						
< Primary school	1			-		
Secondary school	1.10	0.585	0.75–1.62			
High school	1.43	0.093	0.93–2.18			
>High school	1.54	0.030	1.04–2.27			
Occupation						
Worker	1			1		
Office administrator	1.82	0.001	1.28–2.57	1.79	0.001	1.27–2.52
Businessmen	1.60	0.044	1.01–2.54	1.40	0.111	0.92–2.13
Housewife	1.25	0.231	0.85–1.84	1.13	0.439	0.81–1.59
Others	1.32	0.129	0.91–1.91	1.24	0.204	0.88–1.74
Economic status						
Normal	1			-		
Poor	1.46	0.168	0.84–2.51			
Child's age (month)						
2–12	1			1		
13–24	0.74	0.030	0.56–0.96	0.73	0.023	0.55–0.95
>24 – 59	0.82	0.345	0.55–1.23	0.74	0.093	0.53–1.05
How do you remember immunization date?						
Reminded by healthcare workers						
No	1			1		
Yes	2.19	<0.001	1.60–3.01	1.83	<0.001	1.37–2.44
Reminded by SMS from the system						
No	1			-		
Yes	1.25	0.301	0.80–1.95			
Remembered						
No	1			-		
Yes	0.77	0.084	0.58–1.03			
Waiting time (minute)						
≤15	1			1		
16–30	0.51	0.001	0.36–0.74	0.60	0.005	0.42–0.85
31–45	0.32	<0.001	0.19–0.55	0.36	<0.001	0.22–0.61
46–60	0.42	<0.001	0.27–0.63	0.48	0.001	0.33–0.72
>60	0.48	0.070	0.22–1.06	0.57	0.143	0.26–1.21

(Continued)

Table 4 (Continued).

Characteristics	Crude ^a			Adjusted ^b		
	OR	p	95% CI	OR	p	95% CI
Do facilities at this healthcare center meet your need?						
Waiting area						
No				-		
Yes	1.56	0.009	1.12–2.18			
Follow-up area						
No						
Yes	1.98	<0.001	1.45–2.70	2.08	<0.001	1.50–2.89
Vaccine storage						
No						
Yes	2.13	<0.001	1.54–2.96	1.97	<0.001	1.43–2.72
Bathroom area						
No				-		
Yes	1.02	0.967	0.30–3.43			
Do immunization activities meet your need?						
Immunization process						
No						
Yes	3.36	0.010	1.37–9.56	2.57	0.033	1.08–6.12

Notes: ^aAdjusted for cluster effect. ^bAdjusted for cluster effect and other covariates in the final model.

Discussion

Our study revealed a relatively low level of clients’ satisfaction toward child immunization in HCMC. Although it is difficult to compare satisfaction levels across countries or settings because of multifaceted characteristics of this topic, the level of satisfaction in our study is lower than that reported in resource-limited countries such as African countries. Studies conducted in Ethiopia reported that more than 60% of clients satisfied with immunization services.^{7,9} This figure was even higher in Zambia (82.7%).⁸ The difference in measurements is one of the possible explanations for the difference in the level of satisfaction. Moreover, study population and location might also result in different figures. For example, most of participants in the study in Zambia were from rural areas and had a higher level of satisfaction (70%) than ours. This may be because people in urban areas are more likely to expect more from health services than those in rural areas and thus have a lower level of satisfaction.⁸ In two other studies which were conducted on Ethiopian in rural areas, the satisfaction rate was slightly higher than ours.^{12,14} Studies conducted in other countries such as India, Egypt, and Guatemala reported higher overall satisfaction rates than our study with 93.2%, 95.2% and 70.4%, respectively.^{11,17,23} In Vietnam, previous studies conducted at CHCs reported a wide range of levels of satisfaction in vaccination services, from 63% to 75% in Thua Thien-Hue province, Binh Thuan province and Binh Duong province.^{12–14} Moreover, in 2013–2014, UNICEF conducted a big survey in 24 communes in Vietnam and reported that more than 80% participants satisfied in the quality of immunization services.^{24–26} These high numbers might be due to the assessment tools where the questionnaire used by UNICEF was to assess many health services and there was only one question to assess vaccination satisfaction. Coupled with previous studies in the country and comparison of statistics in other countries, urgent interventions are needed to address this issue in Vietnam.

Understanding factors associated with satisfaction can help target intervention populations. In terms of demographic characteristics, many studies have indicated the association between vaccination service satisfaction and mother age and educational level.^{10,14,15} However, these factors were not found significant in our study. In contrast, our multiple logistic models indicated that the focus should be paid to significant factors such as children's age, vaccination reminder methods, CHC's facilities, waiting time and vaccination procedures. Our study found that those who had older children were less likely to satisfy than those who had children between 2 and 12 months old. These findings are parallel with other studies conducted in Binh Duong and Binh Thuan. It can be speculated from these results that the expectations of parents seem higher over the time. Similarly, the positive association between vaccination reminders from health staff and satisfaction has also been reported in previous studies.^{7,12} In Ho Chi Minh City, vaccination reminders were implemented via phone, SMS and home visit. Our findings confirmed the importance of vaccination reminder system to support children vaccination.

Additionally, when COVID-19 occurs and medical declaration procedures are added at CHCs, vaccination procedures at CHCs are also changed. Therefore, the waiting time for vaccination services is longer and has a negative impact on clients' satisfaction. In our study, the longer waiting time people experienced, the less likely they satisfied with the vaccination services. This result is similar to other studies which were conducted in other provinces in the country such as Thua Thien-Hue, and Binh Duong.^{12,13} Most people feel uncomfortable if it took so long for waiting during the vaccination process.^{12,13,15} People with a pre-injection waiting period of less than 30 minutes have 12.2 times higher satisfaction rate than those took over 30 minutes waiting.¹⁶ A study in Ethiopia showed that people with a waiting period of less than 30 minutes have a satisfaction rate of 2 times higher than those took over 30 minutes waiting.⁷ In Vietnam, a study in Binh Duong province reported that many people had to wait from 1 hour to 2 hours in their first time using immunization service at CHCs. These contributed to the low rate of service satisfaction in this province.¹² Previous studies confirmed that accessibility and waiting time are two important indexes resulting in a negative impact on health service satisfaction.^{15,16,18} Therefore, quality improvements in vaccination services are needed to reduce the waiting time.

Our study also found that clients' experiences during their visit for child vaccination at CHCs and whether the experiences met their needs are important factors affecting satisfaction. Among these, the condition of follow-up areas, vaccine storage and immunization process at CHCs were positively associated with clients' satisfaction. The follow-up area is the place where clients and their children spend much time during the vaccination process. Unlike private vaccination centers where better facilities are available, children vaccination at CHCs in Vietnam is under the national program which is free. However, with limited resources available, some CHCs do not have good facilities. Participants in our study suggested that extra seats and fans should be added to make people more satisfied during the waiting time. These findings are parallel with that found in a study in Binh Duong province where immunization service satisfaction was associated with CHCs facilities and vaccination space organization.¹²

Some main limitations should be considered in interpreting our findings. First, the cross-sectional design employed in this study prevents us from confirming the causal relationship between participants' characteristics, experiences and their levels of satisfaction. However, the contribution of this study is that we understand which groups of clients have a lower level of satisfaction and thus improvement can be targeted. Therefore, the associations which were found in our study provide the reference information for future research and interventions. Second, many other factors that can affect clients' satisfaction such as communication between clients with healthcare workers or clients' experiences of vaccination at private centers were not investigated in our study. It is possible that those who had good experiences when using services at private centers might have higher expectations when going to CHCs and thus had lower satisfaction with public facilities. Further studies should include these factors to expand explanations of satisfaction levels. Third, COVID-19 pandemic during the study period might have negative impact on the level of satisfaction in our study. Due to COVID-19 pandemic, the immunization program was suspended during March 2020 – April 2020. In early May 2020, because COVID-19 was under control and there were so many children who missed their vaccination during March 2020 – April 2020, immunization activities at all CHC in the city were recovered. Since there was a large number of clients going to CHC for immunization during our study period, the CHC might be overloaded. Therefore, the level of satisfaction in our study might be underestimated. Moreover, there may be biases in our estimation of satisfaction

level because we only surveyed those who received the immunization at CHC. The satisfaction level might be lower if we included those who did not go to CHC for immunization. Therefore, further studies are needed to confirm our study's findings.

Conclusion

The level of clients' satisfaction toward child immunization at grassroot healthcare centers in Ho Chi Minh City is relatively low. Strategies to improve vaccination programs at CHCs are needed, focusing on clients' experiences at CHCs during vaccination sessions. Further studies are also needed to have an in-depth understanding of more factors affecting satisfaction in this population.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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