

**STUDY ON THE SITUATION OF EXPANDED VACCINATION
IN 2-YEAR-OLD CHILDREN AND MOTHERS' KNOWLEDGE ABOUT
EXPANDED VACCINATION IN GO CONG TAY DISTRICT,
TIEN GIANG PROVINCE IN 2021**

Nguyen Vu Truong Giang^{1*}, *Nguyen Thi Nhu Mai*², *Nguyen Le Ngoc Giau*³,
*Nguyen Van Doi*³

1. Go Cong Tay District Health Center

2. Can Tho Preventive Health Center

3. Can Tho University of Medicine and Pharmacy

*Corresponding author: nvtgiang93@gmail.com

ABSTRACT

Background: *The Expanded Program on Immunization not only protects children's health but also has important socio-political implications. It is one of the top priority national health programs and included in 10 primary health care contents, and it has brought great success in reducing morbidity and mortality in children due to 8 common infectious diseases. Objectives:* (1) *Determining the percentage of vaccinations in full dose on schedule and learn some of the reasons children are not vaccinated and (2) Determining the percentage of mothers with 2-year-old children who have the correct knowledge and some associated factors in Go Cong Tay district, Tien Giang province. Materials and Methods:* *Using a descriptive cross-sectional study, a systematic sampling method was used to collect data on 558 2-year-old children and their mothers in Go Cong Tay district, Tien Giang province. Results:* *The percentage of children receiving expanded vaccination with full doses was 74.8%, of which the percentage of full doses and on the schedule was 22.6%, percentage of full doses and not on the schedule was 52.2%. The main reason for children not being vaccinated was illness was 42.5%, and affected by the COVID-19 epidemic was 46.4%. The percentage of mothers with correct general knowledge about expanded vaccination was 57.5%. The percentage of complete vaccination of children was related to occupation, economic condition, and the mother's general knowledge about expanded vaccination. The mother's correct general knowledge was related to occupation, economic condition, and education level. Conclusion:* *The*

percentage of complete vaccination coverage is low. Therefore, it is necessary to take measures such as continuing to communicate to improve knowledge on expanded vaccination, strengthening confidence in the vaccination program and vaccine safety to limit vaccination services, taking care of children to enough health for vaccination, and ensuring vaccination during epidemics.

Keywords: Expanded vaccination, knowledge, 2-year-old, Tien Giang

I. INTRODUCTION

The Expanded Program on Immunization (EPI) is one of the most successful national target programs for public health care and protection in Vietnam, initiated in 1981 by the Ministry of Health with the support of the World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) [1]. Vaccination is a simple, safe, and effective way to protect people against harmful diseases before exposure to pathogens. Currently, 12 vaccines are available to prevent dangerous infectious diseases, namely tuberculosis, diphtheria, pertussis, tetanus, measles, polio, hepatitis B, Hib pneumonia/meningitis, Japanese encephalitis, cholera, typhoid, and rubella. They are vaccinated free of charge for children and women. Expanded vaccination has contributed to changing disease structure in Vietnamese children. Polio was eradicated in 2000, neonatal tetanus was eliminated in 2005, and diphtheria, whooping cough, measles, and hepatitis B were decreased markedly. The proportion of complete vaccination has reached over 90% over the years. Ensuring that children are vaccinated at the right age is important to maintain sustainable disease prevention [6].

Vaccines now protect more children than ever before, but in 2019, around 14 million children worldwide were not vaccinated with any vaccine. The resurgence of measles in countries where the disease has been eliminated and the frequency of reports from many other countries of vaccine-preventable diseases is alarming. The total number of measles cases reported in May 2019 (168,000 cases) is more than three times the number reported in the same period in 2018 (51,000 cases). According to WHO and UNICEF reports, children are not vaccinated because of lack of interest, beliefs, knowledge, misinformation, and safety in vaccination [13]. The COVID-19 epidemic caused 23 million children to miss out on essential vaccines in 2020 – an increase of nearly 4 million from 2019 [15]. Global coverage for the third dose of diphtheria-tetanus-pertussis (DPT3) decreased from 86% in 2019 to 83% in 2020. WHO/UNICEF estimates for national vaccination coverage also show that 90% of countries report in 2020 DPT3 coverage is stagnant or decreased compared to 2019 with nearly 30%. This is the largest drop in DPT3 vaccine coverage since 2008. Covid-19 has reduced access to life-saving vaccines against measles and polio [14].

The research aims to 1) Determine the percentage of vaccinations in full doses on schedule and find out some of the reasons children are not vaccinated and 2) Determine the percentage of mothers with 2-year-old children with the correct knowledge and some associated factors in Go Cong Tay district, Tien Giang province, in 2021.

II. MATERIALS AND METHODS

2.1. Research subjects

Sample selection criteria: Children aged 2 years old at the time of the survey, children with birth dates from June 1st, 2019 to August 31st, 2019, and the children's mother on the list managed by the Clinics who had permanent residence in the study communes of Go Cong Tay district, Tien Giang province.

Exclusion criteria: The child's mother is absent after 3 times of not seeing the child, the mother has loses the vaccination card or book, and the mother does not directly take care of the child within the first 24 months after birth.

Research period: From 01/2021 to 07/2022.

2.2. Researched Methods

Study Design: Cross-sectional description.

Sample size:

Objective 1: The formula to calculate the sample size with an estimated proportion [9] 95% confidence level, the allowable error is 4%, and p is the percentage of complete and on-time vaccination. The research results of Le Phuc Hien in 2017 in O Mon district, Can Tho city have a percentage of fully vaccinated children on the schedule was 67.1%, $p = 0.67$ [2]. Objective 2: Apply the formula to calculate the sample size to estimate the rate with 95% confidence, the error allowed is 4%, and p is the percentage of mothers with correct knowledge about expanded vaccination. The research results of Le Phuc Hien in 2017 in O Mon district, Can Tho city have a percentage of mothers with correct knowledge about expanded vaccination is 75%, $p = 0.75$ [2]. Since the sample size of the vaccination status survey of 2-year-old children is larger than that of the expanded vaccination knowledge survey of mothers, the sample size of the 2-year-old children's vaccination status survey is selected as the general sample size. To avoid errors and sample loss, the sample was added 5% rounded. Choose the final sample size of 558 2-year-old children and their mothers.

Method: Systematic random sampling method. First, the method selected 1 town and 12 communes. Second, the method makes a list of all 2-year-olds. Third, the method selected children through the coefficient k. Fourth, the method selected the first child x by random drawing. Finally, the method selected the next children by adding x with distance k.

Research content: Find out common characteristics of children and mothers. Collected vaccination data based on the child's vaccination card or book. Reasons for children who did not receive vaccinations and mothers' general knowledge about expanded vaccination were collected based on pre-built questionnaires. Find out associated factors to the percentage of vaccinations in full dose on time and the percentage of mothers with 2-year-old children with the correct knowledge.

Data collection tools and methods: Directly interviewed subjects through pre-built questionnaires and collected data from vaccination records.

Data processing method: Data had entered using Microsoft Excel 2021 software and analyzed using SPSS software version 20.0. Used descriptive statistics to calculate frequencies and proportions. Analysis of related factors used the χ^2 test to test the significance level for the association between two variables, the degree of association measured by OR, and 95% confidence interval with statistical significance at $p \leq 0.05$. Checked Fisher's Exact when $> 25\%$ of cells had an expected value of < 5 .

III. RESULTS

3.1. General characteristics of the study subjects

Table 1. General characteristics of research subjects

Content		Frequency	%	Content		Frequency	%
Children's gender	Male	288	51.6	Occupation	Officer	27	4.8
	Female	270	48.4		Housewife	178	31.9
Mother's age	18-25	57	10.2		Business	70	12.5
	>25-35	415	74.4		Worker	254	45.5
	>35	86	15.4		Other	29	5.2
Education level	Primary	4	0.7	Economic conditions	Lower	10	1.8
	Secondary school	170	30.5		Upper lower	8	1.4
	High School	336	60.2		Middle	424	76
	College, University	48	8.6		Upper middle	116	20.8

The percentage of males is higher than females is 51.6%. Mother's age group > 25-35 is the highest is 74.4%. The percentage of High school is the highest is 60.2%. The percentage of workers is the highest is 45.5%. The percentage of economic conditions in the Middle is the highest at 76%.

3.2. The situation of vaccination with full doses and on a schedule of 2-year-old children

Table 2. Vaccination status of 2-year-old children

Content		Frequency	%	Content		Frequency	%
BCG	Correct	521	93.4	Hepatitis B vaccine for infants	Correct	514	92.1
	Incorrect	34	6.1		Incorrect	27	4.8
	No injection	3	0.5		No injection	17	3
ComBE Five + OPV	Correct	473	84.8	IPV	Correct	227	40.7
	Incorrect				Incorrect	222	39.8
	No injection	85	15.2		No injection	109	19.5
Measles Vaccine	Correct	406	72.8	MR	Correct	371	66.5
	Incorrect	125	22.4		Incorrect	135	24.2
	No injection	27	4.8		No injection	52	9.3
Japanese Encephalitis (JE) Vaccine	Correct	244	43.7	Vaccination Status	Complete, correct	126	22.6
	Incorrect	287	51.4		Complete, incorrect	291	52.2
	No injection	27	4.8		No injection	141	25.3

Vaccination status:

The percentage of BCG injections on schedule is 93.4%; not on schedule is 6.1%, and no injection is 0.5%. The percentage of Hepatitis B vaccine of infant vaccination on schedule is 92.1%; not on schedule is 4.8%; no injection is 3%. The percentage of injections of ComBE Five and OPV with an injection or oral is 84.8%; no injection or oral is 15.2%. The percentage of IPV injections on schedule is 40.7%; not on schedule is 39.8%; no injection is 19.5%. The percentage of measles vaccination on schedule is 72.8%; not on schedule is 22.4%; no injection was 4.8%. The percentage of MR injections on schedule is 66.5%; not on schedule is 24.2%; no injection is 9.3%. The percentage of injections of JE vaccination on schedule is 43.7%; not on schedule is 51.4%; no injection is 4.8%. The percentage of complete vaccination is 74.8%; in which the dose is complete and on schedule is 22.6%; incomplete dose is 52.2%.

Table 3. Reasons for children not being vaccinated

Reason	Frequency	%	Reason	Frequency	%
Vaccines not available	38	6.8	Injecting service	96	17.2
Sick children	237	42.5	Unknown/forgot schedule	85	15.2
Mother is afraid of child accidents after vaccination	8	1.4	Due to the Covid-19 epidemic	259	46.4

The reason why children are not vaccinated is because of the impact of the Covid-19 epidemic, accounting for 46.4%; followed by children who were sicked with 42.5%; mothers who have switched to vaccination services for children with 17.2%; mothers who did not know or forget the vaccination schedule accounted for 15.2%; Vaccination was not available with 6.8% and mothers who were afraid of complications for their children after vaccination with 1.4%.

3.3. Knowledge about expanded vaccination of mothers

Table 4. Mother's correct knowledge about post-vaccination reactions

Content		Frequency	%	Content		Frequency	%
Post-vaccination reactions	Fever	527	94.4	Post-vaccination reactions	Crying	310	37.6
	Swelling, pain	331	59.3		Unknown	3	0.5

The highest percentage of post-injection reactions is fever 94.4%; followed by swelling and pain at the injection site 59.3%; fussiness 37.6%, and unknown 0.5%.

Table 5. General knowledge of mothers about expanded vaccination

Knowledge	Frequency	%
Correct	321	57.5
Incorrect	237	42.5

The appropriate general knowledge of mothers about the expanded program on immunization (EPI) was 57.5%, while the inappropriate one was 42.5%.

3.4. Factors related to full doses and proper vaccination schedule of 2-year-old children and appropriate knowledge of mothers about EPI

Table 6. Factors related to full doses and proper vaccination schedule of 2-year-old children and correct knowledge of mothers about EPI

Factors related to full doses and proper vaccination schedule of 2-year-old children	Multivariate analysis		Factors related to correct knowledge of mother about EPI	Multivariate analysis	
	OR (95% CI)	p		OR (95% CI)	p
Occupations	0.454 (0.251-0.821)	p = 0.009	Occupations	2.521 (1.309-4.857)	p = 0.006
Officers			Officers		
Manual workers	-	-	Manual workers	-	-
Economic status	1.701 (1.078-2.686)	p = 0.023	Economic status	3.784 (2.421-5.915)	p < 0.001
≤ Average			≤ Average		
Well-off, rich	-	-	Well-off, rich	-	-
General knowledge	1.729 (1.152-2.596)	p = 0.008	Levels of education	0.631 (0.432-0.921)	p = 0.017
Correct			≤ Secondary school		
Incorrect	-	-	≥ High school	-	-

Factors related to full doses and proper vaccination schedule of 2-year-old children when being multivariate analyzed were occupations with OR = 0.454 (CI 95%, 0.251-0.821) and p = 0.009; economic status with OR = 1.701 (CI 95%, 1.078-2.686) and p = 0.023; general knowledge with OR = 1.729 (CI 95%, 1.152-2.596) and p = 0.008. Factors related to appropriate knowledge of mothers about EPI when being multivariate analyzed were: Occupations with OR = 2.521 (CI 95%, 1.309-4.857) and p = 0.006; Economic status with OR = 3.784 (CI 95%, 2.421-5.915) and p < 0.001; Levels of education with OR = 0.631 (CI 95%, 0.432-0.921) and p = 0.017.

IV. DISCUSSION

According to WHO, the neonatal dose of hepatitis B vaccine should be injected into neonates as soon as possible (within the first 24 hours after birth), especially in high-risk epidemic areas where the majority of populations infected with hepatitis B by the route of mother-to-child transmission, including Vietnam. The Ministry of Health issued the decision 2620/QĐ-BYT about instructions for hepatitis B vaccination for neonates and required the percentage of neonatal hepatitis B vaccine within 24 hours postpartum to reach 65% or more [5]. In our research, the percentage of neonatal hepatitis B vaccine within 24 hours postpartum was 92.1%, higher than that of Luu Bang Phi (45%) [4] and Tran Nguyen Du (46.6%) [11]. This result is quite reasonable because of the improvement of general knowledge about neonatal vaccination, the development of medical care for mothers during pregnancy, neonates were born healthy, and Clinics were fully equipped with vaccinations.

The proportion of the proper vaccination schedule of the 5-in-1 vaccine decreased gradually from the first dose to the second dose to the third dose, with respective figures of 74.2%, 65.9%, and 55.9%; close behind the results of Le Nguyen Minh Nguyet's research with 74%, 71%, 67.5% [3]. The covid-19 epidemic was the major contributor to the condition of unvaccinated children, accounting for 46.4%; the second greatest reason was sickness during the vaccination schedule, occupying 42.5%; injecting service 17.2% and mothers didn't know or forgot the schedule 15.2%. Nguyen Ho Mai's research also showed the reasons why children were unvaccinated, including children who did not have enough health for injection (59.5%) and service injection (20.2%) [7].

The proportion of children with full EPI was 74.8%, the proportion of full doses and proper vaccination schedules was 22.6%, and full doses but improper vaccination schedules was 52.2%, which was close to Tu Lan Vy's research (fully vaccinated was 88.8%, proper schedules were 43.9%, the improper schedule was 44.9%) [12]. For the aforementioned reasons, we can see that the decline in full doses of vaccination and the increase in improper schedules is understandable. Therefore, effective solutions are necessary to ensure vaccination schedules during the epidemic, taking good care of children so that they do not get sick when it is time for vaccination, using media to improve general knowledge for mothers to remember the vaccination schedules for their children and feel secure about expanded vaccination to limit vaccination service.

Knowledge of injection site reactions: fever accounted for the highest percentage with 94.4%, swelling and pain at the injection site with 59.3%, and crying at 37.6%; these results were higher than Phan Le Thu Hang's research with fever at 34%, swelling and redness at the site 27%, anorexia 20.3% [8]. This is because of effective media programs as well as pre-injection counseling and easily accessible information.

The percentage of mothers with appropriate general knowledge about EPI was 57.5%, which was close behind the research of Tu Lan Vy (63.6%) [12]. The general knowledge of mothers was not generally high, possibly because the majority of them are manual workers, their levels of education are mainly high school graduates, and their economic status is at an average level; therefore, these mothers are insufficiently knowledgeable about vaccinations. However, most of them know about the EPI due to the vaccination results achieved, the management of mothers from pregnancy and post-partum, the media programs, as well as consultation and invitation letters of the medical collaborators to ensure the vaccination schedules for children.

The higher the correct knowledge of mothers about vaccination, the higher their children were vaccinated. Mothers with manual labor occupations with average or lower economic status have more vaccinated children because these mothers were unaffordable for injecting services. Tu Lan Vy's research showed factors related to incomplete and improper schedules, including levels of education, occupations, and general knowledge of mothers [12].

Mothers with levels of education lower than secondary school graduates have lower knowledge of vaccination than mothers with levels of education higher than high school. They were similar to Pham Thi Ngoc's research [10]. This is acceptable because mothers with higher levels of education will quickly gain knowledge about vaccination and easy access to various information sources.

V. CONCLUSIONS

The percentage of children with full EPI was 74,8%, in which full doses and proper schedules were 22,6%, and full doses but improper schedules were 52,2%. The main reasons for unvaccinated children were sickness 42,5% and being affected by the Covid-19 epidemic 46,4%. The percentage of mothers with appropriate general knowledge about EPI was 57,5%. The high percentage of children receiving expanded vaccination with full doses and on the schedule was related to the correct general knowledge of mothers about EPI and mothers with manual occupations as well as average or lower economic conditions. The percentage of mothers with the correct knowledge was related to those with intellectual occupations, mothers with average or lower economic conditions, and higher education levels than high school graduates. It is necessary to develop effective media programs to improve knowledge about EPI and encourage the belief of mothers in the vaccination programs and the safety of vaccines, thus limiting the vaccination services, taking care of children to enough health for vaccination, and ensuring vaccination during the epidemic.

REFERENCES

1. Expanded Immunization Project and Ministry of Health (2012), *Achievements of 25 years of Expanded Immunization in Vietnam*.
2. Le Phuc Hien (2017), *Research on vaccination status in children under 1 year old and mothers' knowledge about vaccination in O Mon district, Can Tho city in 2017*, Thesis Level I, Can Tho University of Medicine and Pharmacy.
3. Le Nguyen Minh Nguyet (2015), *Research on hepatitis B vaccination in children under 1 year of age and knowledge and attitudes about vaccination among mothers in Le Binh ward, Cai Rang district, Can Tho city in 2014*, Thesis Doctor of Preventive Medicine, Can Tho University of Medicine and Pharmacy.
4. Luu Bang Phi (2015), *Research on hepatitis B vaccination in newborns in the first 24 hours and mothers' knowledge and attitudes in An Binh ward, Ninh Kieu district, Can Tho city in 2014*, Thesis Doctor of Preventive Medicine, Can Tho University of Medicine and Pharmacy.
5. Ministry of Health (2012), *Decision 2620/QĐ-BYT on the promulgation of "Guidelines for the implementation of neonatal dose hepatitis B vaccination"*.
6. Ministry of Health (2014), *Decision 1730/QĐ-BYT "Instructions on storage of vaccines"*.
7. Nguyen Ho Mai (2019), *Current status of full and timely vaccination of 8 vaccines in children under 1 year of age and some related factors in O Cho Dua ward, Dong Da district, Hanoi in 2019*, Mater's Thesis in Public Health, Thang Long University.
8. Phan Le Thu Hang (2016), "Knowledge and practice of mother with children full 12 months of age on expanded immunization in Thanh Ha district, Hai Duong province in 2014-2015", *The Journal of Preventive Medicine*, Episode XXVI, No. 5 (178).
9. Pham Van Linh (2010), *Health Science Research Methods (first edition, revised)*, Hue University Publishing House.
10. Pham Thi Ngoc (2021), "Some factors related to knowledge and practice of monitoring post-vaccination reactions of mothers with children under 1 year old in Kien Thuy district, Hai Phong city in 2019-2020", *Journal of Preventive Medicine*, Episode 31, No. 1.
11. Tran Nguyen Du, Le Minh Huu, Nguyen Tan Dat, Pham Thi Tam (2018), "Situation of neonatal hepatitis B vaccination and some related factors in the Mekong Delta in 2015", *Can Tho Journal of Medicine and Pharmacy*, Episode 13 - 14, page. 153 - 160.
12. Tu Lan Vy (2021), *Research on the situation and factors related to expanded immunization for children under 1 year old of mothers with children aged 12-24 months in Cho Moi*

district, An Giang province, Thesis of Master of Medicine, Can Tho University of Medicine and Pharmacy.

13. UNICEF (2019), *Leaving no one behind: All children immunized and healthy.*
14. World Health Organization (2020), *Progress and Challenges with Achieving Universal Immunization Coverage.*
15. World Health Organization (2021), *Immunization and vaccine-preventable communicable diseases.*

(Received: 11/6/2022 – Accepted: 20/07/2022)
