Vaccination Coverage among Children Under-5 Years of Age in El Quseir City, Red Sea Governorate

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Abstract

Background: One of the best strategies to protect young infants from potentially fatal infections is through vaccination. Tardiness in vaccinations can lead to infectious disease outbreaks because vaccines administered outside of the recommended vaccination schedule create gaps in immunity that make kids more susceptible to infections.

Objectives: To determine vaccination coverage among children less than 5 years of age and to generate data to provide recommendations to improve immunization coverage.

Materials and methods: Our study was a cross-sectional study conducted in the El-Quseir Health Office, El-Quseir City, Red Sea Governorate, Egypt, from March 2023 to June 2023. Data were collected from 283 mothers of under-five children attending the El-Quseir health office via face-to-face interviews; using a pre-designed, pretested, and structured Arabic questionnaire with a brief introduction or explanation of the idea of the research to the children's mothers.

Results: Knowledge of the mother on vaccination and vaccine-preventable diseases were found among 230 (76.7%), information regarding the benefits and effectiveness of vaccines was reported by 89%, details on when the child should receive the vaccines was reported by 267 (89%), and information regarding the risk and side effects of vaccines was true among 68 (22.7%). There was a significant association between full vaccination and information regarding the benefits and effectiveness of vaccines and vaccination information sources.

Conclusion: Mothers were well-informed about vaccinations and had a favorable attitude towards diseases that can be prevented by vaccinations.

Keywords: Vaccination; Immunization; Immunity.

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Introduction

One of the best strategies to protect young infants from potentially fatal infections is through vaccination. For example, polio and diphtheria are becoming uncommon in many nations worldwide through timely and efficient immunization **(Reid and Fleck., 2014).** In 1974, the World Health Organization (WHO) launched the Expanded Programme of Immunization (EPI) with the goals of lowering the risk of contracting diseases that can be prevented by vaccination and increasing immunization coverage of basic children's vaccinations. Significant advancements have been achieved globally with the introduction of the Expanded Program me of Immunization (EPI) **(Keja et al., 1988).**

Tardiness in vaccinations can lead to infectious disease outbreaks because vaccines administered outside of the recommended vaccination schedule create gaps in immunity that make kids more susceptible to infections. Therefore, it's critical to take into account both high vaccination rates and prompt vaccination administration to fully benefit from immunization programs. Generally speaking, only doses given during normal immunization appointments are counted, not doses given during large-scale immunization programs **(Haider et al., 2019).**

The aim of work was to determine prevalence of vaccination coverage among children under five 5 years, and to generate data that provide recommendations to improve immunization coverage.

Materials and methods

Our study was a cross-sectional study conducted in El-Quseir Health Office, El-Quseir City, Red Sea Governorate, Egypt, from March 2023 to June 2023. Data were collected from 283 mothers of under-five children attending the El-Quseir health office via face-to-face interviews; using a predesigned, pretested, and structured questionnaire was used as a tool for data collection. The mothers were interviewed and asked in Arabic. The questionnaire used involves 4 sections (I-Socio-demographic and economic characteristics 12 items), (II-vaccination coverage data and knowledge 10 items), (III-Practice 4 items) and (IV-Attitude 2 items). The questionnaire was adapted from different literature on similar studies in English to increase the comparability of the findings. The questionnaire is filled by interviewing mothers (child caregivers) about the following: age of the child, gender of the child, number of children in the family, area of residence, religion, socioeconomic status according to monthly household income, type of the family, mother ' s age, mother ' s education, mother ' s occupation, father ' s education, father ' s occupation, knowledge present before vaccination positive or negative information were present, knowledge of the mother on vaccination and vaccine-preventable diseases, information regarding risk and side effects of vaccines, information regarding benefits and effectiveness of vaccines, is there is educational program provided in the health office about vaccination, information about when the child will receive the vaccine, does the child have allergies, is there any condition prevent the child from getting the vaccine, vaccination information source, vaccination status, utilization of ante-natal care (ANC), tetanus toxoid immunization for mothers (TT), delivery of the mother using Health Institute services, will you advice your relatives and family to get vaccinated, parent ' s attitude toward vaccination and additional doses of vaccines given to the child. with a brief introduction or explanation of the idea of the research to the children's mothers. They were selected by a simple random sample. Child health cards were examined to assist in the judgment of the vaccination status of the children. Mothers who were not willing to participate in the study or children who lost or no longer had vaccination cards were excluded from the study. The study protocol and

questionnaire were approved by the Research Ethics Committee review board of Qena Faculty of Medicine, South Valley University. All participants were informed that participation is completely voluntary, and data collectors introduced and explained the research to participants. No names were recorded on the questionnaires, and all questionnaires were kept safe.

Ethical approval code: SVU-MED-COM009-1-22-12-516

Statistics/data analysis

The data will be collected and registered for further statistical analysis. Analysis will be done using the Statistical Package for Social Sciences (SPSS) software program (version 26). Qualitative variables will be recorded as frequencies and percentages and will be compared by chi-square test. Quantitative measures will be presented as means ± standard deviation (SD) and will be compared by Student t-test. Regression analysis and correlation between different variables will be performed as indicated. A P-value < 0.05 will be significant.

Results

Vaccination coverage data is demonstrated in (**Table.1**). Knowledge of the mother on vaccination and vaccine-preventable diseases was found among 230 (76.7%), information regarding the benefits and effectiveness of vaccines was reported by 89%, details on when the child should receive the vaccines was reported by 267 (89%), and information regarding the risk and side effects of vaccines was true among 68 (22.7%) .

Table 1. Vaccination coverage data

Variable	Frequency	Percentage (%)
The knowledge present before vaccination		
• Positive information	300%	100%
• Negative information	-	-
Mother's knowledge about vaccination and vaccine-preventable diseases		
• True	230	76.7 %
• False	70	23.3 %
Information regarding the risks and side effects of vaccines		
• True	68	22.7 %
• False	232	68.3 %
Information regarding the benefits and effectiveness of vaccines		
• True	267	89.0 %
• False	33	11.0 %
Is there an educational program provided in the health office about vaccination?		
• Yes	-	-
• No	300	100%
Does the child have allergies to medications, food, vaccine components, or latex?		
• Yes	284	94.7 %
• No	16	5.3 %
Is there any condition that prevents the child from getting the vaccine?		
• Yes	-	-
• No	16	5.3 %
Information about when the child will receive the vaccine		
• True	293	97.7 %
• False	7	2.3 %
Vaccination information source		

• Family members • Friends • Internet • Medical staff • Neighbors	101 65 17 77 40	33.7 % 21.7 % 5.7 % 25.7 % 13.3 %
Vaccination status		
• Partially vaccinated • Fully vaccinated	232 68	77.33% 22.67%
• Yes • No	291 9	97.0 % 3.0 %
Tetanus toxoid immunization for mothers		
• Yes • No	295 5	98.3 % 1.7 %
Delivery of the mother using Health Institute services		
• Yes • No	274 26	91.3 % 8.7 %
Will you advise your relatives and family to vaccinate their children?		
• Yes • No	300 -	100 % -
Parent's attitude toward vaccination		
• Positive • Negative	300 -	100 % -
Additional doses of vaccines given to child		
• Yes • Oral polio vaccine • Oral polio vaccine + Measles • No	288 107 181 12	96 % 35.66% 60.33 % 4%

Vaccination information was obtained from family members at 101 (33.7%), the medical staff at 77 (25.7%), friends at 65 (21.7%), neighbors at 40 (13.3%), and the internet at 17 (5.7%). 291 (97%) of the participants utilized anti-natal care, 295 (98.3%) had their tetanus toxoid immunization, and 274 (91.3%) had health institute delivery. Children given additional doses of vaccines were 288 (96%). Regarding full vaccination, only 68 (22.7%) had their vaccination and 232 (77.3%) did not take their full vaccine, with a statistically significant association between vaccination and level of education as shown in (**Table .2**) and (**Fig.1**).

Table 2. Socioeconomic and demographic factors concerning full vaccination

Variables **N (%)**	**Not Vaccinated** (n=232)	**Fully Vaccinated** (n=68)	**P-value**
The number of children in the family			
• 1 • 2 • ≥3	63(27.2) 103(44.4) 66(28.4)	14(20.6) 31(45.6) 23(33.8)	0.494 [a]
The number of children in the family			
• Urban • Rural	226(97.4) 6(2.6)	64(94.1) 4(5.9)	0.242 [b]

Socioeconomic status			
• Poorest • Poor • Middle • Rich	6(2.6) 61(26.3) 142(61.2) 23(9.9)	0(0.0) 16(23.5) 42(61.8) 10(14.7)	0.398 [b]
Mother`s education			
• Illiterate • Read and write • Primary • Preparatory • Secondary • Institute • University	13(5.6) 14(6.0) 11(4.7) 15(6.5) 106(45.7) 27(11.6) 46(19.8)	4(5.9) 0(0.0) 0(0.0) 2(2.9) 30(44.1) 10(14.7) 22(32.4)	**0.048**[b]
Mother`s occupation			
• Housewife • Employed	176(75.9) 56(24.1)	51(75.0) 17(25.0)	0.884[a]

Bold P-value: significant; a: Pearson-Chi Square test; b: Fisher Exact test.

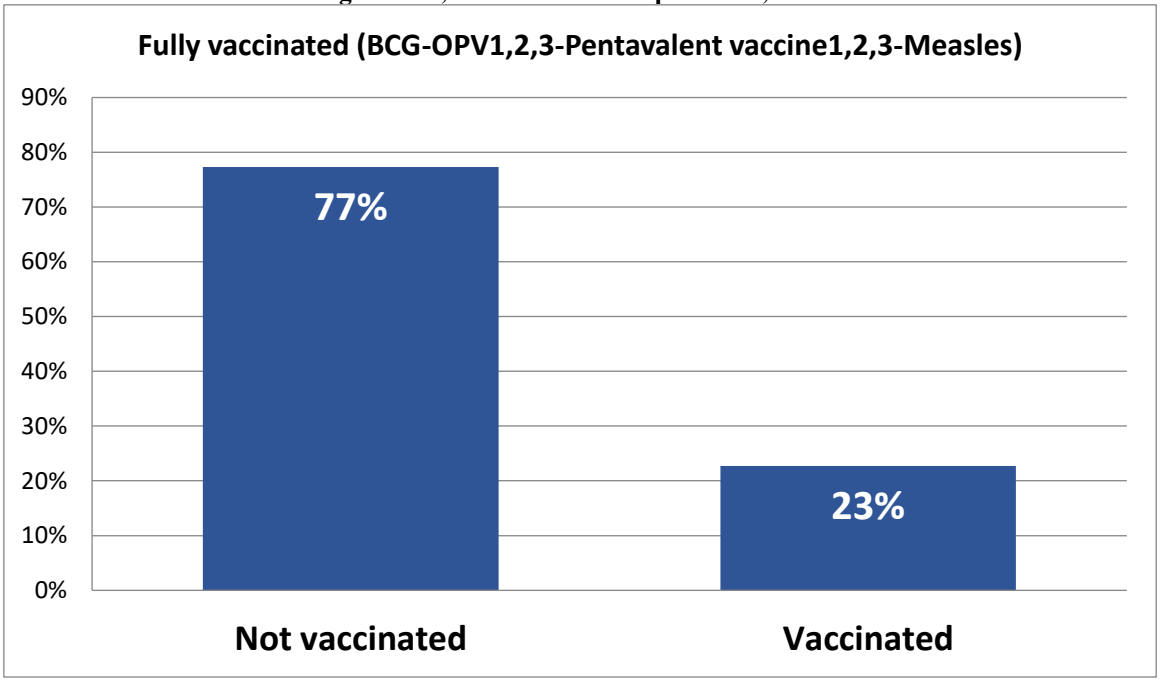

Fig.1. Vaccination status

There were a significant associations between full vaccination and information regarding the benefits, effectiveness of vaccines, and vaccination information sources (P<0.05) **(Table.3)**.

Table 3. Knowledge, practice, and attitude factors concerning children's full vaccination

Variables N (%)	Not Vaccinated (n=232)	Fully Vaccinated (n=68)	P-value
Knowledge of the mother on vaccination and vaccine-preventable diseases			
• True • False	176(75.9) 56(24.1)	54(79.4) 14(20.6)	0.543[a]
Information regarding the risks and side effects of vaccines			
• True • False	56(24.1) 176(75.9)	12(17.6) 56(82.4)	0.261[a]

Information regarding the benefits and effectiveness of vaccines			
• True • False	201(86.6) 31(13.4)	66(97.1) 2(2.9)	**0.016**[b]
Allergies to medication, food, vaccine components, or latex			
• Yes • No	13(5.6) 219(94.4)	3(4.4) 65(95.6)	0.701[b]
Vaccination information source			
• Family members • Friends • Neighbors • Internet • Medical staff	81(34.9) 41(17.7) 36(15.5) 13(5.6) 61(26.3)	20(29.4) 24(35.3) 4(5.9) 4(5.9) 16(23.5)	**0.016**[b]
Utilization of anti-natal care			
• Yes • No	223(96.1) 9(3.9)	68(100.0) 0(0.0)	**0.126**[b]
Delivery of the mother using Health Institute services			
• Yes • No	211(90.9) 21(9.1)	63(92.6) 5(7.4)	0.661[a]

Bold P-value: significant; a: Pearson-Chi Square test; b: Fisher Exact test.

Discussion

Immunization protects against illness, disability, and death from vaccine-preventable diseases such as measles, pertussis, diphtheria, polio, rubella, and tetanus. It has significantly decreased the burden of infectious diseases. A child's immunization dramatically lowers the expense of disease care, ensuring a healthy childhood and lessening poverty and misery **(Siddiqi et al., 2010).** In the present study, we aimed to assess the vaccination coverage for childhood vaccines in children and identify factors associated with compliance with age-appropriate vaccination in El Quseir City. The present study was conducted among 300 children and their mothers (child caregivers) who were attending the El Quseir Health Office. In the present study, knowledge of the mother on vaccination and vaccine-preventable diseases was found among 230 (76.7%), information regarding the benefits and effectiveness of vaccines was reported by 267 (89%), and information about the time when a child should receive the vaccines was reported by 293 (97.7%), However, we found a low level of knowledge about the risk and side effects of vaccines; 68 (22.7%) only knew the risks and side effects related to vaccines.

A study by **Khalil et al.(2022)** in Snorus district of El-Fayoum city ' s Maternal- Child Health Centers (MCH) (rural areas), showed that77.1%, 78.6% and 82.9% of mothers respectively have insufficient understanding of the meaning, importance, types and side effects of immunization. However, post implementation of health education there were a significant improvement in mothers ' knowledge and practice from 28.6% at the pre- health education program to 75.7%, but in a study done in Sudan, the results revealed that near to half of the studied mothers had a poor knowledge score of 41.4% **(Mohammed and Al-Zahrani, 2021)**

In our study, information regarding the risk and side effects of vaccines was true in 22.7% of mothers.

As regard knowledge of the parents about child ' s vaccination **Alruwaili et al.(2018)** study in Arar, Northern Saudi Arabia reported that 88.3% of parents make sure that vaccinations are important for their children , 68.4% think that

vaccination reduces the probability of death or illness of the child, 85.6% think that vaccinations reduce the number of infectious diseases,89.6% think that vaccinations has a role in child health, 83.1% aware that even healthy child needs vaccines ,66.2%know that there are many types of vaccines , 69.8% agreed that some vaccines are accompanied with side effects such as fever and only 21.3%aware that some vaccines cause convulsions and skin rash.

In our study information regarding the benefits and effectiveness of vaccines was true for 89% of mothers.

Our findings, in harmony with a study done by **Hamid(2012)** in a rural area of North Kashmir, India, to assess mothers' knowledge, attitude, and practice (KAP) about immunization of children, illustrated the good knowledge, good practice, and good attitude of the studied mothers. Another study by **Abidoye and Odeyemi (2013)** was done in Kosofe Local Government Area of Lagos State, Nigeria, which reported that mothers have good knowledge, a positive attitude, and good practice towards childhood immunizations**.** In a study conducted in Libya, **Bofarraj(2011)** reported that the side effects and contraindications of immunization as alleged by mothers were fever at 8.2%, deformity at 5%, convulsions at 2.4%, and diarrhea at 2.2%. This finding is attributed to the lack of health education and preparation curriculum**.**

In **Kyprianidou et al.(2021)** study among 703 Cypriot mothers, the most source of information regarding children ' s vaccination among the mothers was the pediatrician 89.6%. In **Alruwaili et al.(2018)** study 36% of parents know about vaccination from doctors, 41.1% from relatives and friends,19.6% from social media and only3.3%form TV

In our study, the main source of information was family members 33.7% followed by medical stuff 25.7% and friends 21.7%

Moreover, an Iraqi study about parents' knowledge and practice regarding immunization related to pediatrics' immunization compliance revealed that two-thirds of parents have adequate knowledge-practice scores **(Al-Lela et al., 2014).** However, the study conducted by **Ramadan et al.(2016)** in Egypt reported that less than one-third of the studied mothers had good knowledge scores related to children's obligatory vaccination, more than one-third of mothers had good practice scores, and more than two-thirds of participants had good attitude scores**.** Also, **Ahmed et al.(2013)** found that most of the mothers (68.0%) had adequate baseline information.

In our study, the main source of information was family members 33.7% followed by medical stuff 25.7% and friends 21.7% and from the Internet at 5.7%. Moreover, variant sources were reported, as more than half of mothers get information about diseases prevented by vaccines from the TV, followed by nurses from the MCH.

The variation between studies may be due to differences in the study locations and population characteristics.

In the current study, the majority of mothers 98.3% had gotten their tetanus toxoid immunization, this had agreed with **Ahmed and El- Berrawy (2019)** who reported that tetanus immunization for pregnant women is one of the Egyptian health priorities. Maternal acceptance of recommended vaccination is the main key to improving maternal immunization rates. Yet more than two thirds of surveyed women in Dakahlia governorate received all the recommended doses of tetanus toxoid. Our percentage of vaccinated women reaches the target coverage indicated in the Global Vaccine Action Plan (GVAP).

Our finding in harmony with a study done by **Girmay and Dadi (2019)** in this study mother ' s anti-natal care follow up positively influenced the immunization status of the children especially among

those attended ANC services at least three times compared to mothers who did not attend ANC at all. These findings suggest the need to encourage women to seek health care services during pregnancy and promote utilization following childbirth.

Conclusion

We concluded that moms are well-informed about vaccinations and have a favorable attitude towards diseases that can be prevented by vaccinations. On the other hand, few moms are well-informed about the dangers and adverse reactions associated with vaccinations. To improve mothers' knowledge, more health education initiatives focusing on immunization are required, with a focus on those living in rural regions, slums, and villages. In addition, since the Ministry of Health's mandated vaccination schedule does not currently include information on the many immunization kinds and their accessibility, it is imperative to continue educating moms.

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