

## Effect of Health Education On Mothers' Knowledge and Practices of Children Under-Five-Year Regarding Immunization in Rural Area

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### Abstract

**Background:** Immunization is when a child is made immune or resistant to an infectious disease by administering a vaccine. These vaccines help to stimulate the body's immune system to protect the children against subsequent diseases. This study aims to evaluate the effect of health education for Mothers' of Children Under-Five-Year regarding Immunization in Rural Area. **Design:** The quasi-experimental test design was employed. **Sample:** A purposive sample included 70 mothers had children with age under five years and more attended the routine immunization. **Setting:** The research was carried out at the Sanors district of El-Fayoum City's Maternal-Child Health Centers (MCH) (rural area). **Two tools for data collection: Tool I** Demographic structured interview sheet **Tool II:** Mother knowledge and practices about immunization of children under five years (pre-post format). **Results:** the mother's knowledge and practices increased after applying health education, Post-health education mothers had 75.7% good experience than (28.6%) pre-health education for mothers. In addition, found significant between pre-health education and post for reported immunization practices. **Conclusion:** The study found that mothers' knowledge and practices improved more in the post-health education than in the pre-health education phase, with a statistically significant difference. **Recommendations:** In MCH center, mothers should be provided with health information and immunization booklets that the benefits of immunization, side effects, home care, obligate vaccination plans, and a non-obligatory vaccine schedule.

**Keywords:** Immunization- Mothers- knowledge- practices

### Introduction

The expanded programme of immunization (EPI) is a priority program for Egypt due to its cost-effective ability to save lives. EPI in Egypt has achieved several successes in controlling vaccine-preventable diseases including a strong national vaccination coverage. The Egyptian Ministry of Health and Population (MOHP) has launched a countrywide children vaccination program in recent years. During this time, MOHP employees and Egyptian academic specialists collaborated with foreign partners from American Practitioners for Infections, World Health Organization (W.H.O) and Naval Medical Research Unit No. 3 (NAMRU-3) to produce national infection control guidelines. Global coverage dropped from 86% in 2019 to 83% in

2020. An estimated 23 million children under the age of one year did not receive basic vaccines, which is the highest number since 2009 **World Health Organization, (2020)**.

In 2020, the number of completely unvaccinated children increased by 3.4 million. Only 19 vaccine introductions were reported in 2020, less than half of any year in the past two decades. 1.6 million more girls were not fully protected against human papillomavirus (HPV) in 2020, compared to the previous year overview. While immunization is one of the most successful public health interventions, coverage has plateaued over the last decade. The COVID-19 pandemic and associated disruptions have strained health systems, with 23 million children missing out on vaccination in 2020, 3.7 million more than in

2019 and the highest number since 2009. During 2020, about 83% of infants worldwide (113 million infants) received 3 doses of diphtheria-tetanus-pertussis (DTP3) vaccine, protecting them against infectious diseases that can cause serious illness and disability or be fatal. Only 19 vaccine introductions were reported in 2020 (not including COVID-19 vaccine introductions), less than half of any year in the past two decades. This slowdown is likely to continue as countries focus on ongoing efforts to control the Covid-19 pandemic, and on the introduction of Covid-19 vaccines. Global immunization coverage 2020 A summary of global vaccination coverage in 2020 follows. **World Health Organization, (2020).**

Meningitis A is an infection that is often deadly and leaves one in five affected individuals with long-term devastating sequelae. Before the introduction of MenAfriVac in 2010 – a revolutionary vaccine– meningitis serogroup A accounted for 80–85% of meningitis epidemics in the African meningitis belt. By the end of 2020 almost 350 million people in 24 out of the 26 countries in the meningitis belt had been vaccinated with MenAfriVac through campaigns. 11 countries had included MenAfriVac in their routine immunization schedule by 2020. Measles is a highly contagious disease caused by a virus, which usually results in a high fever and rash, and can lead to blindness, encephalitis or death. By the end of 2020, 84% of children had received one dose of measles-containing vaccine by their second birthday, and 179 Member States had included a second dose as part of routine immunization and 70% of children received two doses of measles vaccine according to national immunization schedules. **World Health Organization ,(2020).**

Mumps is a highly contagious virus that causes painful swelling at the side of the face under the ears (the parotid glands), fever, headache and muscle aches. It can lead to viral meningitis. Mumps vaccine had been introduced nationwide in 123 Member States by the end of 2020. Pneumococcal diseases include pneumonia, meningitis and febrile bacteraemia, as well as otitis media, sinusitis and bronchitis. Pneumococcal vaccine had been introduced in

151 Member States by the end of 2020, including three in some parts of the country, and global third dose coverage was estimated at 49%. Polio is a highly infectious viral disease that can cause irreversible paralysis. In 2020, 83% of infants around the world received three doses of polio vaccine. In 2020, the coverage of infants receiving their first dose of inactivated polio vaccine (IPV) in countries that are still using oral polio vaccine (OPV) is estimated at 80%. Targeted for global eradication, polio has been stopped in all countries except for Afghanistan and Pakistan. Until poliovirus transmission is interrupted in these countries, all countries remain at risk of importation of polio, especially vulnerable countries with weak public health and immunization services and travel or trade links to endemic countries. Yellow fever is an acute viral haemorrhagic disease transmitted by infected mosquitoes. As of 2019, yellow fever vaccine had been introduced in routine infant immunization programmes in 36 of the 40 countries and territories at risk for yellow fever in Africa and the Americas. In these 40 countries and territories, coverage is estimated at 45%. Key challenges. In 2020 17.1 million infants did not receive an initial dose of DTP vaccine pointing to lack of access to an immunization and other health services and an additional 5.6 million are partially vaccinated. Of the 23 million more than 60% of these children live in 10 countries: Angola, Brazil, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Mexico, Nigeria, Pakistan and the Philippines. **World Health Organization, (2020).**

Monitoring data at subnational levels is critical to helping countries prioritize and tailor vaccination strategies and operational plans to address immunization gaps and reach every person with life-saving vaccines. WHO response WHO is working with countries and partners to improve global vaccination coverage, including through these initiatives adopted by the World Health Assembly in May 2012. Immunization Agenda 2030. IA2030 sets an ambitious, overarching global vision and strategy for vaccines and immunization for the decade 2021–2030. It was co-created with thousands of contributions from countries and

organizations around the world, and came into effect after World Health Assembly endorsement. It draws on lessons from the past decade and acknowledges continuing and new challenges posed by infectious diseases (e.g. Ebola, COVID-19). A dedicated vaccination program was formed in 1984 under the Ministry of Health as part of the government's commitment to preserving Egyptian communities' public health and the formulation of national guidelines on infection control via immunization. According to WHO statistics, Egypt's current immunization program has seen a significant increase in coverage over the years. **World Health Organization, (2020).**

Every year, the government claims to vaccinate 2.7 million children. They use a method to maintain high immunization coverage levels among children by administering regular immunizations and undertaking additional vaccination initiatives. Children are the manifestation of our dream. They are society's most vulnerable category. As a result, children require special care in order to live a healthy life. Children are particularly vulnerable to disease for a variety of causes. Vaccines have protected the life of thousands of infants when appropriately used **Hinman et al., (2019).**

Children's growth and development are a long-term contribution to society as a whole. All primary health care stresses prevention values as the secret to achieving the aim of health. Vaccines for all infectious diseases are one of the most cost-effective preventive treatments. Immunization is a top priority in newborn and child care. High immunization rates have almost eradicated multiple infectious diseases used to wipe out a large portion of a country's population. Like adults, each child has basic human needs to meet the necessities of life and foster growth and development, so immunization is one of the children's requirements **(Jose, et al. (2020).**

Vaccines, which defend against illness by prompting immunity, are universally and regularly distributed worldwide, relying on the common-sense idea that it is easier to prevent children from

becoming sick than to cure them if they become ill, thus avoiding injury and death. Immunization aims to artificially induce active immunity so that pathogen susceptibility can be tested in the lab using any dead or seriously weakened antigens. Vaccines are provided to prevent various types of illness. When an antigen enters the body via immunization, the body recognizes it as foreign and produces antibodies to combat and remember it. If they find it again, they will fight it **Melief, et al.(2018).**

Tuberculosis, diphtheria, tetanus, poliomyelitis, and whooping cough are six contagious diseases from which the infant must be vaccinated. Children under the age of five will be saved from mortality by immunizing them at the appropriate age and the appropriate period and completing the whole immunization course. Many variables may affect immunization coverage, and essential variations should be considered, such as the incidence of vaccine-preventable diseases, the availability of vaccination facilities, the extent of immunization awareness and records, and the various approaches used to assess immunization status **frazier,etal. (2019).**

According to the United Nations Children's Emergency Fund (UNICEF), immunization prevents approximately two million deaths of children under the age of five per year. In 2010, the global availability of the three doses of diphtheria, pertussis, and triple tetanus vaccine increased by 78% last year for children under the age of five. Nevertheless, DPT did not reach 27 million children worldwide in 2010, including 9.6 million in Sub-Saharan Africa and 9.9 million in South Asia **Centers for Disease Control and Prevention (2018) .**

Since 1990, more than 70% of children around the world have been immunized with routine vaccinations. The international community approved a concrete goal of immunizing at least 90% of children in each country by 2010 at a special session of the United Nations General Assembly in 2007. Community health nurses (CHN) of health clinics, hospitals, colleges, and MCH centers would still be on healthcare frontlines regarding immunization issues. They are responsible for assisting with parents' education on

the dangers and advantages of immunization, prescribing vaccinations, and providing services to all afflicted with vaccine-preventable diseases **The Public Health Agency of Canada (2019)**.

Mothers play an important role in improving children's health. Several misconceptions and a lack of awareness about optional vaccinations are common among mothers, particularly children under five. Improving health, disease knowledge, and disease prevention or management has effectively improved various health outcomes in high-income countries, particularly compared with fewer literate communities. **(kmatov.etal. 2018)**.

Community health nurses should be familiar with the concept of risk communication because it is an essential method for discussing immunizations with coworkers, families, and communities and communicating the importance of certain vaccine-preventable illnesses such as polio and diphtheria to non-vaccinated people **Jose,etal. (2020)**.

Through their capacity as immunization educators, community health nurses are often dedicated to supplying them with the resources they need to be effective. The American Nurses Association has created a cutting-edge interactive webinar that draws on basic information regarding vaccinations and immunization prevention and expertise to enhance immunization competency and contact with parents **Bernse,etal.(2018)**.

Community health nurses are significant persons in making sure mothers receive accurate information regarding precautionary care practices regarding immunizations. Quality Improvement (QI) program geared to low-income families' literacy levels will facilitate parental knowledge and understanding of routine childhood immunizations in this community **Luthu,etal.(2019)**.

Nursing health information around immunizations will help reduce parental misunderstandings and misconceptions about vaccinations, resulting in higher immunization rate **AL-lela,etal.(2017)**.

### **Significance of the study**

The World Health Organization has reported that there are 2.2 billion children under the age of five years globally, out of a total population of 7.29 billion people. According to UNICEF, Egypt has 13.07 million children under the age of five out of a total population of 96.37 million people. In developed countries, however, nearly 3 million children died, making immunization one of the most promising and cost-effective public health measures in the ongoing fight against diseases that threaten human health **World Health Organization (2020)**.

Because these children are more vulnerable to infection, mortality rates in developing countries may be higher. In developing countries, approximately 23 percent of children under the age of five year die within the first month; in Egypt, the under-five mortality rate is 48/1000 live births **Hong,etal.(2018)**.

As a result, the nationwide immunization effort is conducted on a basis to increase all children's immunization rates. Since this vaccination serves to strengthen children's immune systems, children that are only partly immunized or have not been immunized at all might be at risk for the illness that these vaccinations avoid. Despite this, the mothers remain oblivious of the benefits of immunizations **Haneef,etal.(2018)**.

### **Aim of the study:**

Assess the effect of health education for mothers of children under the age of five on immunization in rural areas.

- An assessment of mothers' immunization health information needs.

- Design and implement health education according to mothers' needs.

- Evaluate the effect of health education about immunization on mothers' needs

**Research hypothesis:** Mothers' knowledge and practices will increase after applying for health education regarding mother's needs for immunization.

### Subject and method

**Subject and method for this study were portrayed under four main designs as the following:**

1. Technical design
2. Operational design
3. Administrative design
4. Statistical design

#### 1. Technical design

The technical design included research design, setting, subject, and tools for data collection.

#### Research Design:

A quasi-experimental research design was used to conduct the current study.

#### Setting:

The present study was conducted at the Maternal– Child Health Center (MCH) in Sanors district. Fayoum city .Egypt. The Maternal– Child Health Centers (MCH) at Sanors district consists of two floors on the first floor. There are four rooms for (gynecology examination, pediatric investigation, pharmacy, and child vaccination room). The child vaccination room consists of two chairs, a desk, a cupboard, and one refrigerator in this room. The nurses administrate child vaccination , height and weight measure & apply health education for mothers with good ventilation and lighting. The second floor consists of five rooms for the administrative issue. These settings were selected because it serves the biggest region of the children.

#### Sample:

A purposive sample included 70 mothers who had children with age under five years and more attended the routine immunization. the sample size was chosen random from total of

378 in six months Child Health Center (MCH) in the Sanors district. Fayoum city .Egypt. the start of August 2020 to the end of January 2021. For this study,

#### Sample inclusion criteria:

- Mothers who had children aged under five years and more attended the routine immunization in selected centers and not exposed to similar intervention.

#### Sample exclusion criteria:

Mothers with children over the age of five and are unwilling to participate in the study.

#### Tool for data collection:

Data for this study were collected by using the following tool:

#### Tool 1: Demographic structured Interview sheet.

#### Tool 11: Mother knowledge and practices about immunization of children under five years (pre-post format):.

After reviewing national and foreign literature, the investigator created. It was divided into two parts:

#### 1<sup>st</sup> Part: Socio-demographic characteristics of the studies sample & child medical history consists of four sub-items:

**A.** The socio-demographic characteristics of the mothers included four closed-ended questions like age, social status, occupation, level of education, and three open-ended questions like monthly income, family number, and crowing index.

**B.** Three closed-end questions about fathers' demographic features, such as age, profession, and education degree, were used.

**C.** Three closed-ended questions, like age and sex, were asked about child demographic characteristics.

## **2<sup>nd</sup> Part: Mothers' knowledge and practices about immunization it is consist of two items:**

### **1<sup>st</sup> item: Mothers' knowledge about immunization of children under five years, which had three sub-items:**

A. The mother's total immunization experience is evaluated. It asked twelve closed-ended questions about the significance of immunization, its side effects, contraindications, allergic reactions, immunization information sources, and how to deal with immunization side effects.

B. The mother's knowledge of obligatory vaccines is assessed. It included 18 closed-ended questions on immunization schedules, hepatitis B vaccination literacy, Tetanus, Diphtheria, Pertussis vaccine experience, poliomyelitis vaccine knowledge, rubella, mumps, measles, varicella vaccine knowledge, and poliomyelitis vaccine knowledge.

C. It consisted of ten closed-ended questions about Mothers' awareness of non-obligatory vaccinations, Rotavirus vaccine knowledge, Haemophilus influenza type B vaccine information, pneumococcal and hepatitis A vaccine knowledge, and meningitis vaccine knowledge.

D. Concerning the child's previous medical records, there were four closed-ended questions about BCG vaccine side effects, hepatitis B vaccine side effects, and side effects following vaccination, as well as two open-ended questions about hepatitis B vaccine and BCG vaccine side effects

### **➤ System of scoring for knowledge of obligatory, non-obligatory immunization, and general immunization knowledge: -**

This answered as the following:

- Yes = two-point.
- No = one point.

➤ The item scores were compiled and converted into a percentage. There are three levels of knowledge: good (75 percent or above), average (60-75 percent), and poor (60 percent or less).

➤ Assessment of mothers' reported immunization practices for children under the age of five years. It consisted of 3 closed-ended care questions pre, post-immunization, and care about BCG vaccine.

### **2<sup>rd</sup> item: mothers practice regarding immunization of children under five years.**

It consisted of 3 closed ended questions regarding care before, after immunization and care after BCG vaccine.

### **➤ Scoring System for practice reported by mothers' regarding immunization: -**

This answered as the following:

- Done = two points.
- Not done = one point.

This section's total score was six points, and it was scored as follows:

- Satisfactory practice  $\geq$  60% degree.
- Unsatisfactory practice  $<$  60% degree.

### **2- Operational design:**

The preparatory process, pilot research, and fieldwork phases were all performed during various study phases.

### **Tool's content validity:**

The data collection tool was tested for validity by 5 expertise (3 from community health nursing and 2 from pediatric nursing) at the faculty of nursing Ain shams University who reviewed the tools. They were also asked to assess the items regarding completeness and clarity. No modifications were done to the tools.

### **Tool reliability:**

Reliability tested the study tool for calculating Cronbach's Alpha, which was 0.894

for the interview questionnaire sheet to assess reliability.

**A pilot study:** A pilot study of 10% of the total sample (7 mother's) was done to examine the clarity and feasibility of the research method; no changes were made. Mothers who took part in the pilot were not included in the study.

### **Ethical Considerations:**

After the purpose of the research was clarified to the participants, they agreed to participate. The mothers were briefed about the study's purpose and what will be achieved with the findings prior to data collection. They were given the option to deny participating in the study and were informed that they might withdraw during the study. They were also told that the details would be kept private and used for testing research only.

### **Fieldwork:**

#### **Nursing education program regarding immunization for mothers' of children under five years' phases:**

The investigator designed the program based on review of recent, current, national, and international related literature in different aspects of immunization of under-five years' intervention program.

#### **Phase I: Assessment phase:**

The investigator first introduced herself and explained the purpose of the study briefly to the mothers. Every mother was met individually, and written consent for participation was obtained. The mothers were assured that the obtained information would be treated confidentially and used only for the study. The investigator read, explained each item of the study scales in front of the mother separately, and recorded her responses to each item. The time consumed for answering the study questionnaire was ranged from 30-45 minutes.

#### **Phase II: Planning phase:**

Based on the result obtained from the assessment phase, the investigator designed the nursing health education sessions contents according to the mothers' needs. The nursing education program sessions were developed after reviewing related literature. Detected needs and requirements were clarified and discussed in the form of a booklet. Contents of the booklet were selected based on identified needs. The booklet consisted of knowledge about immunization such as meaning and types of immunity system, types of immunization importance, schedule, the side effect of immunization, contraindication of immunization, and how to deal with its side effect.

#### **Teaching methods and media used:**

lecture and open discussion, brainstorming was frequently applied during sessions. Media such as PowerPoint; data show, pictures, video, and booklet prepared by the investigator.

#### **Phase III: Program implementation phase:**

- Program implementation based on conducting session plan using different educational methods and media and the use of guideline booklet specially designed and developed based on mothers' needs.

- The program's implementation took about six months, three days per week (Monday, Wednesday, and Tuesday) from 8 am – 12 pm. The investigator collected about 4 – 5 mothers per day till the needed sample was completed. The number of hours different from one session to another to accomplish the nursing education program. The investigator divided into 14 groups, and each group consists of 24 mothers. The program was divided into 3 sessions.

- Under-five years of nursing education program's general objective was to improve the mothers' knowledge and practice regarding childhood immunization.

- The specific objective of the program: by the end of the under five years nursing education program, each mother will be able to know the mean of immunization, identify its importance, list types of immunity and types of immunization, explain obligatory & non-obligatory immunization, enumerate its side effect and how to deal with it, explain nursing care for children pre, during and after immunization.

- In this phase, the investigator analyzes the pre-test and then designer the intervention to each mother's needs. There was a commonality among mothers' needs; also, there was a lack of knowledge in most items and needed to improve their practice.

- Program session: time allowed 48 hours allocated for program session. At the beginning of the first session, orientation about the program and its purpose was considered using simple and straightforward language.

- At the end of the program, an immediate post-test was done.

#### **Program Booklet:**

A booklet including all program content was designed <sup>11</sup>and given to mothers as an educational reference during and after the program implementation. It aimed to provide accurate knowledge and practice about childhood immunization.

#### **Phase IV: Evaluation phase:**

This phase aimed to evaluate nursing health education for mothers' needs to children under five years' immunization immediately from its implementation by using the same post-test methods to evaluate the degree of knowledge and effectiveness of nursing education program on mothers' needs to children under five years' immunization.

#### **3- Administrative design:**

Permission was obtained by submission of an official letter issued from the Dean of

Faculty of Nursing- Fayoum University forward to directors of Maternal- Child Health Centers (MCH) the at Sanors district in Fayoum City, including the aim of the study to obtain the permission to visit MCH and conduct the study. Each MCH director was notified of the study and the date and time of data collection.

Given from the second session, so each session started with a summary about what was given through the previous session and the objectives of the new one

#### **4- Statistical design:**

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26. The Chi-Square test was used to examine the relationship between two qualitative variables. The Pearson Correlation (r) is used to correlate between parameters.

#### **Results**

Table 1 shows that mothers were on a mean age  $29.5 \pm 6.2$  years old. In addition, 18.6 percent of the mothers were divorced. Furthermore, 37.1 percent and 58.6 percent of mothers had a Secondary education and housewives. In addition, 7.1 percent and 55.7 percent of mothers reside in urban areas, with a home crowding index of 4-5. 50% of the mothers had a monthly wage that not efficient essential need monthly.

Table (2) shows that 78.7% of children were not admitted to the incubator after delivery. Also, 90.0% of children were vaccinated with BCG vaccine after delivery, 72.9% didn't have BCG side effects, and 48.6% of mothers kept the site clean and dry and clean by warm water in dealing with BCG vaccine side effect. Also, 87.1% of children were vaccinated with hepatitis B vaccine after delivery, 68.6 of them didn't have hepatitis B side effects. Additionally, 68.6 of the mothers apply stretch compress with hepatitis B side effects. 100% of the children did leg heal sample and were vaccinated with oral poliomyelitis Vaccine at 15 days after delivery, respectively. According to the research hypothesis, a Nursing education program will

increase mothers' knowledge regarding children under five years' immunization.

Table (3) shows that 77.1 percent, 78.6 percent, and 82.9 percent of mothers, respectively, have insufficient understanding of the meaning, importance, types, and side effects of immunization. This table indicates that post-implementation of health educational , mothers' knowledge of immunizations improved far more than pre- health education.

Table (4): Shows a marked improvement in mothers' total knowledge regarding general immunization post-implementation of health education with a highly statistically significant difference where good knowledge was 75.7% better than 28.6% at pre-program (P-value < 0.001).

Pre- and post-heath health education frequency distribution of the mother's total knowledge regarding general knowledge about immunizations.

Table (5) indicates that mothers had poor knowledge of mandatory immunizations prior to the test but that this knowledge increased during the post-educational program. Also, post-implementation of the educational program, there was an extremely statistically significant increase in mothers' knowledge regarding obligatory immunization compared to pre-program (P-value < 0.001).According to

Table (6), 74.6 percent of the mothers had poor knowledge about non-obligatory immunization prior to the education program, which improved during the education program. With a P-value of 0.001, there was also a highly statistically significant increase in mothers' knowledge of non-obligatory immunization following the implementation of the educational program.

Table (7): Shows a statistically significant improvement in mothers' practice regarding immunization in post-program than pre-program in all practice items.

Figure (2) shows that 69.8% of mothers had a marked improvement in mothers' total practice about immunizations after implementing an educational program with a statistically significant difference where p-value < 0.001 between pre and post-test after implementing the educational program.

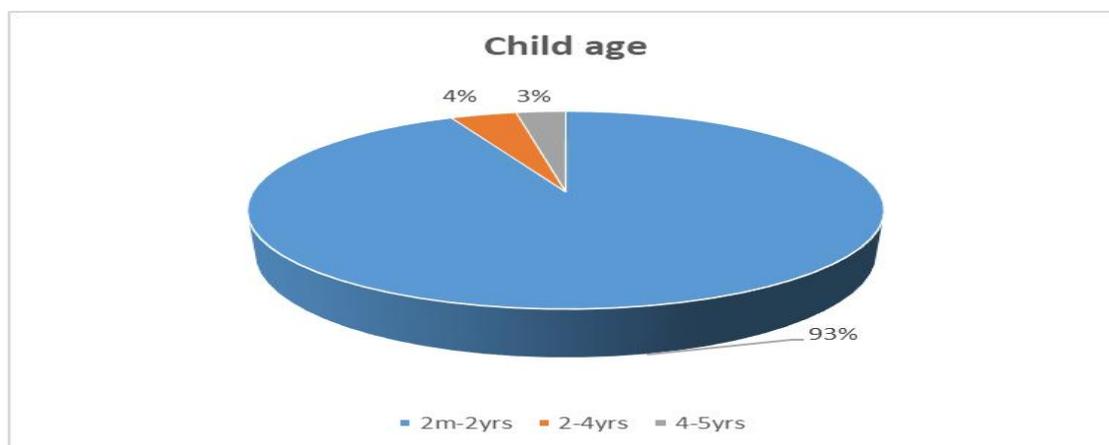
Table (8) indicates a statistically significant relationship between mothers' total knowledge of immunizations post-educational program, residency, and marital status. Furthermore, there was a statistically significant relationship between mothers' total knowledge of immunizations post-health education and their educational degree and age with p-values of 0.024 and 0.036, respectively. There was also a statistically significant relationship (p-value=0.001) between mothers' total knowledge of immunizations post-health education and a job.

Table(9) demonstrates a highly statistically significant relationship between mothers' total immunization practice (educational degree and residence), with P values = 0.001 and 0.018, respectively. There was also a statistically significant relationship between mothers' total immunization practice and age, crowding index, profession, and monthly salary, with p-values of 0.007, 0.017, and 0.001, respectively.

Table (10) demonstrates a positive correlation between mothers' total practice and total knowledge of immunization. Furthermore, there was a highly significant increase in mothers' total practice and total knowledge

**Table (1): Mothers' Socio-Demographic Characteristics Frequency Distribution (N=70).**

Variables	No	%
<b>Age</b>		
< 20	20	28.5
20-<30	35	50
30-40	15	21.4
<b>Mean ± SD =</b>	<b>29.5±6.2</b>	
<b>Marital Status</b>		
Divorced	13	18.6
Widow	11	15.7
Married	46	65.7
<b>Consanguinity</b>		
Yes	22	31.4
No	48	68.6
<b>Mothers' education</b>		
Illiterate	11	15.7
Read and write	23	32.9
Secondary education	26	37.1
University	10	14.3
<b>Mothers' job</b>		
Housewife	41	58.6
Employee	16	22.9
Student	13	18.6
<b>Residence</b>		
Urban	5	7.1
Rural	65	92.9
<b>Crowding index</b>		
1-3	13	18.3
4-5	39	55.7
>5	18	25.7
<b>family income</b>		
Enough and safe	12	17.1
Enough	23	32.9
Not enough	35	50

**Figure (1 a, b): Frequency Distribution of the Children Demographic Characteristics (N=70).****Figure (1 a):** This shows that 93 % of children were aged 2 months to 2 years.

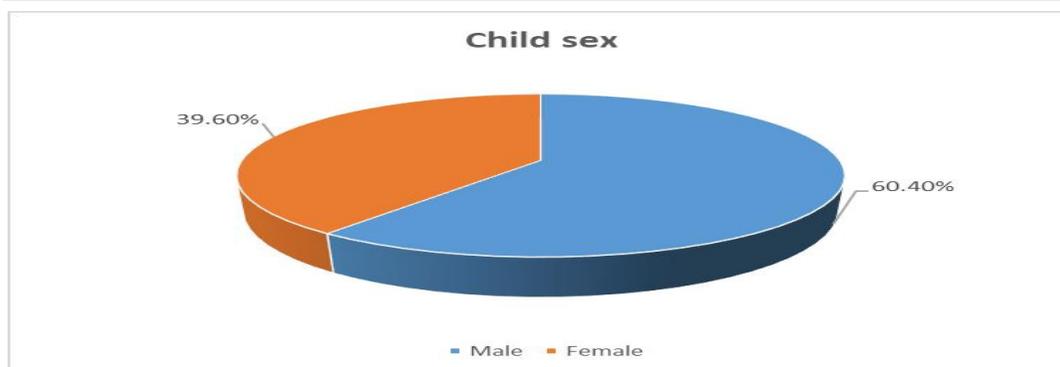


Figure (1b): This shows that 60.4% of the children were male, and 39.6% were female.

Table (2): Frequency Distribution of the Children's Past Medical History (N=70).

Variables	No	%
<b>Previous history of incubator admission after delivery</b>		
- Yes	15	21.4
- No	55	78.6
<b>BCG vaccine after delivery</b>		
- Yes	63	90.0
- No	7	10.0
<b>BCG side effects</b>		
- Yes	19	27.1
- No	51	72.9
<b>If yes, how to deal with BCG vaccine side effect ( N = 70 )</b>		
- Keep the site clean and dry	34	48.6
- Clean the site with warm water	13	18.6
- Do not use ointment on the site.	13	18.5
- Do not squeeze or scratch the site	10	14.3
<b>Hepatitis B vaccine at first 24 hours from delivery</b>		
- Yes	61	87.1
- No	9	12.9
<b>Hepatitis B vaccine side effects</b>		
- Yes	22	31.4
- No	48	68.6
<b>If yes, how to deal with Hepatitis B vaccine side effect ( N=93 )</b>		
- Apply tap water compress to reduce fever	15	21.4
- Apply the stretch compress to reduce swelling where the shot was given	42	60.00
- Giving analgesia as prescribed to reduce pain and redness where the shot was given	13	18.6
<b>Leg heal sample</b>		
- Yes	70	100
<b>Oral poliomyelitis Vaccine at 15 days after delivery</b>		
- Yes	70	100

**Table (3): Frequency Distribution of the Mothers knowledge according to health education regarding immunization of children under five years,Pre & Post (N=70).**

	Pre-health education		Post-health education		$\chi^2$	P				
	Yes	No	Yes	No						
Meaning of immunization	16	22.9	54	77.1	65	92.9	5	7.1	70.33	<0.001**
Importance of immunization	15	21.4	55	78.6	63	90.0	7	10.0	66.70	<0.001**
Effect of vaccines on child immunity	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>Child type of immunity:</b>										
- Natural immunity	10	14.3	60	85.7	66	94.3	4	5.7	90.26	<0.001**
- Acquired immunity	4	5.7	66	94.3	67	95.7	3	4.3	113.4	<0.001**
- Both together	3	4.3	67	95.7	67	95.7	3	4.3	117.01	<0.001**
Importance breast feeding	22	31.4	48	68.6	61	87.1	9	12.9	45.01	<0.001**
Immunization Side effects:										
- Fever	20	28.6	50	71.4	64	91.4	6	8.6	57.61	<0.001**
- Redness	20	28.6	50	71.4	68	97.1	2	2.9	70.49	<0.001**
- Tenderness	19	27.1	51	72.9	65	92.9	5	7.1	62.98	<0.001**
- Loss of appetite	3	4.3	67	95.7	67	95.7	3	4.3	117.02	<0.001**
Child immunization allergy	13	18.6	57	81.4	59	84.3	11	15.7	60.51	<0.001**
<b>Contraindications of immunization:</b>										
- Severe allergic event to vaccines	2	2.9	68	97.1	67	95.7	3	4.3	120.73	<0.001**
- Cancer patient.	3	4.3	67	95.7	68	97.1	2	2.9	120.74	<0.001**
- Acute febrile illness	2	2.9	68	97.1	69	98.6	1	1.4	128.28	<0.001**
- Fits	4	5.7	66	94.3	68	97.1	2	2.9	117.12	<0.001**
<b>Sources of information:</b>										
- MCH nurses	10	14.3	60	85.7	59	84.3	11	15.7	68.61	<0.001**
- Relative	60	85.7	10	14.3	10	14.3	60	85.7	71.43	<0.001**
- Social media	6	8.6	64	91.4	66	94.3	4	5.7	102.94	<0.001**
- T.V	2	2.9	68	97.1	16	22.9	54	77.1	12.49	<0.001**
Mothers experience with immunization from another child	18	25.7	52	74.3	59	84.3	11	15.7	48.51	<0.001**
Child vaccination in campaigns less than week	11	15.7	59	84.3	60	85.7	10	14.3	66.614	<0.001**

\*\*; Highly significant at p-value < 0.001

**Table (4): Frequency Distribution of mothers' total mother's knowledge health education regarding to immunization of children under five years. (N=70).**

Total knowledge of Immunizations	General		Pre-health education		Post-health education		P. value
	No	%	No	%	No	%	
Good	20	28.6	53	75.7			<0.001**
Average	7	10.0	6	8.6			
Poor	43	61.4	11	15.7			

\*\*; Highly significant at p-value < 0.001

**Table (5):**Frequency Distribution of mothers' knowledge health education regarding to immunization of children under five years about Obligatory Immunization (N=70).

Variables	Pre-health education				Post-health education				$\chi^2$	P
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
<b>2-month vaccine</b>										
Hepatitis B vaccine	16	22.9	54	77.1	65	92.9	5	7.1	70.33	<0.001**
Oral poliomyelitis vaccine	15	21.4	55	78.6	63	90.0	7	10.0	66.70	<0.001**
Diphtheria& Tetanus and Pertussis vaccine	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>4 months vaccine</b>										
Hepatitis B vaccine	18	25.7	52	74.3	59	84.3	11	15.7	48.51	<0.001**
Diphtheria& Tetanus and Pertussis vaccine	22	31.4	48	68.6	61	87.1	9	12.9	45.01	<0.001**
Oral poliomyelitis vaccine	12	17.1	58	82.9	58	82.9	12	17.1	60.46	<0.001**
<b>6 months vaccine</b>										
Hepatitis B vaccine	9	12.9	61	87.1	63	90.0	7	10.0	83.38	<0.001**
Oral poliomyelitis vaccine	14	20	56	80.0	60	85.7	10	14.3	60.65	<0.001**
Diphtheria& Tetanus and Pertussis vaccine	14	20	56	80.0	62	88.6	8	11.4	66.32	<0.001**
<b>9-month vaccine</b>										
Active Oral poliomyelitis vaccine	32	45.7	38	54.3	58	82.9	12	17.1	21.03	<0.001**
Oral vitamin A capsule	12	17.1	58	82.9	58	82.9	12	17.1	60.46	<0.001**
<b>12 months vaccine</b>										
Measles &mumps and rubella vaccine	9	12.9	61	87.1	63	90	7	10.0	83.38	<0.001**
Active Oral poliomyelitis vaccine	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>18 months vaccine</b>										
Diphtheria& Tetanus and Pertussis injection	18	25.7	52	74.3	59	84.3	11	15.7	48.51	<0.001**
Active Oral poliomyelitis vaccine	22	31.4	48	68.6	61	87.1	9	12.9	45.01	<0.001**
Measles &mumps and rubella vaccine	16	22.9	54	77.1	65	92.9	5	7.1	70.34	<0.001**
Oral vitamin A capsule	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>4 years vaccine</b>										
Oral poliomyelitis vaccine	41	58.6	29	41.4	65	92.9	5	7.1	22.37	<0.001**

\*\*; Highly significant at p-value < 0.001

**Table (6):**Frequency Distribution of mothers' knowledge health education regarding to immunization of children under five years about Non-Obligatory Immunization (N=70).

Variables	Pre-health education				Post-health education				$\chi^2$	P
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
<b>2 months vaccine</b>										
Pneumococcal and Rota virus vaccine	9	12.9	61	87.1	63	90.0	7	10.0	83.38	<0.001**
<b>4-month vaccine</b>										
Pneumococcal and Rota virus vaccine	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>6-month vaccine</b>										
Pneumococcal and Rota virus vaccine	18	25.7	52	74.3	59	84.3	11	15.7	48.51	<0.001**
Haemophilus influenza type B vaccine	22	31.4	48	68.6	61	87.1	9	12.9	45.01	<0.001**
<b>12 months vaccine</b>										
Hepatitis A vaccine	16	22.9	54	77.1	65	92.9	5	7.1	70.33	<0.001**
Chicken box vaccine	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>18 months vaccine</b>										
Chicken box vaccine	41	58.6	29	41.4	65	92.2	5	7.2	22.37	<0.001**
<b>24 months vaccine</b>										
Meningococcal vaccine	14	20.0	56	80	60	85.7	10	14.3	60.65	<0.001**
Active Hepatitis A vaccine	12	17.1	58	82.9	61	87.1	9	12.9	68.73	<0.001**
<b>4 years vaccine</b>										
Active BCG a vaccine	32	45.7	38	54.3	59	84.3	11	15.7	22.89	<0.001**

\*\*; Highly significant at p-value < 0.001

**Table (7):** The Frequency Distribution The mothers' practices health education regarding immunization of children under five years, (N=70).

Items	Pre-health education				Pos- health education				$\chi^2$	P	
	Done		Not done		Done		Not done				
	No	%	No	%	No	%	No	%			
<b>Care before immunization:</b>											
- Clothes easy to take off											
- Avoid child feeding before immunization directly by one hour	8	11.4	14	20.0	4	5.7	4	5.7	74.37	<0.001**	
- Avoid pain reliever before administration of vaccines	2	2.9	27	38.6	41	58.6	2	2.9			
	4	5.7	15	21.4	14	20.0	5	7.1			
<b>Care after immunization:</b>											
- Avoid child feeding after immunization directly by one hour										<0.001**	
- Apply tap water compress by to reduce fever	3	4.3	6	8.6	7	10	4	5.7	23.64		
- Apply stretch compress to reduce swelling where the shot was given.	5	7.1	2	2.9	14	20.0	5	7.1			
- Use antipyretics as prescribe	22	31.4	2	2.9	31	44.3	1	1.4			
<b>Care after BCG vaccine:</b>											
- Keep the site clean and dry										25.91	0.007*
- Clean by warm water											
-Use ointment on the site where the shot was given	10	14.3	12	17.1	6	8.6	3	4.3			
- Apply tip water compress by to reduce fever	5	7.1	5	7.1	6	8.6	9	12.9			
- Use antipyretics as prescribe	11	15.7	4	5.7	6	8.6	10	14.3			
- Avoid dressing in pimple keep the site exposed.	1	1.4	2	2.9	2	2.9	10	14.3			
	11	15.7	4	5.7	6	8.6	2	2.9			
	1	1.4	4	5.7	8	11.4	2	2.9			

\*: Significant at p-value < 0.05, \*\*; Highly significant at p-value < 0.001

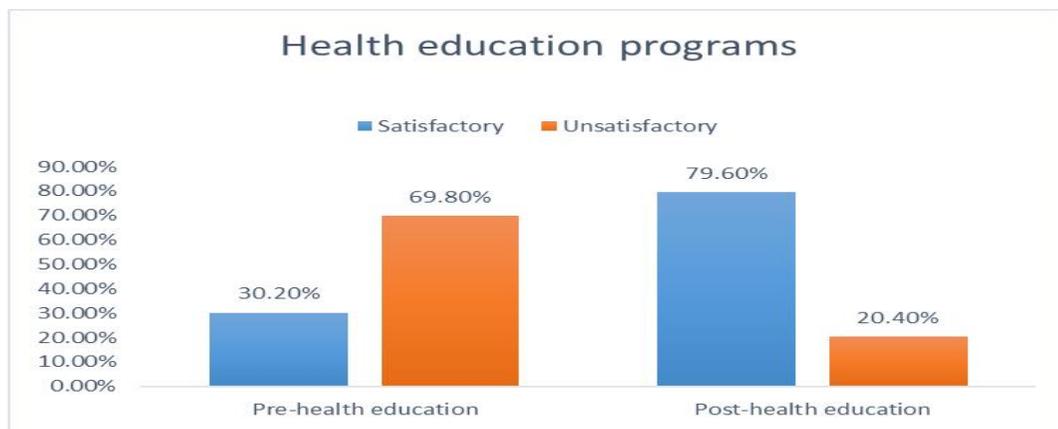


Figure (2): The Frequency Distribution of Mothers' Total Practice of pre and post-health education (N=70).

Table (8): The Relationship Between Mothers' Socio-Demographic Characteristics and Total Immunization Knowledge Following a health education (N=70).

Demographic characteristics		Total knowledge after the health education						X <sup>2</sup>	P-value
		Good (N= 35)		Average (N= 20)		Poor (N= 15)			
		N	%	N	%	N	%		
Age	< 20 years	17	48.6	4	20	4	26.7	10.26	0.036*
	20-<30 years	12	34.3	7	35	9	60		
	30-40 years	6	17.1	9	45	2	13.3		
Marital Status	Divorced	7	20	4	20	4	26.7	12.75	0.013*
	Widow	4	11.4	10	50	2	13.3		
Mother's education	Married	24	66.6	6	30	9	60	14.59	0.024*
	Illiterate	15	42.9	3	15	2	13.3		
	Read and write	8	22.9	6	30	1	6.7		
	Secondary	5	14.3	7	35	4	26.7		
Mother's job	University	7	20	4	20	8	53.3	16.611	0.001*
	Housewife	21	60	3	15	5	33.3		
	Employee	11	31.4	8	40	2	13.3		
Residence	Student	3	8.6	9	45	8	53.3	11.77	0.003*
	Urban	26	74.3	15	75	4	26.7		
	Rural	9	25.7	5	25	11	73.3		

\*: Significant at p-value < 0.05

**Table (9): Relation between Socio-Demographic Characteristics of the Studied Sample and their Reported Practice by reported mothers Post health education about Immunizations (N=70).**

Variables		Total Practice post health education program				X2	P-Value
		Unsatisfactory (N= 70 )		Satisfactory (N= 70)			
		N	%	N	%		
Age	<20 years	46	65.7	30	42.9	9.84	0.007*
	20-<30 years	14	20	31	44.3		
	30-40 years	10	14.2	9	12.9		
Marital Status	Married	22	31.4	14	20	7.97	0.019*
	Divorced	41	60	38	54.3		
	Window	6	8.6	18	25.7		
Residence	Urban	47	67.1	59	84.3	5.59	0.018*
	Rural	23	32.9	11	15.7		
Crowding index	1-3	44	62.9	41	58.6	8.12	0.017*
	4-5	16	22.9	7	10		
	>5	10	14.3	22	31.4		
Educational level	Illiterate	8	11.4	26	37.1	20.24	<0.001**
	Reading & writing	11	31.4	5	7.1		
	Secondary	22	57.1	39	55.7		
	University	40	40.0	3	4.3		
Mother's job	Housewife	46	65.7	34	48.6	11.55	0.003*
	Employee	15	21.4	33	47.1		
	Student	9	12.9	3	4.3		
Income	Safe & save	39	55.7	8	11.4	34.07	<0.001**
	Safe & not efficient	22	31.4	31	44.3		
	Un Safe & not efficient	9	12.9	31	44.3		

\*; Statistically significant at  $p < 0.05$ ; \*\*; highly significant at  $p < 0.001$ .

**Table (10): Correlation between Mothers' Knowledge and Practice Regarding Immunization.**

Items	r	Total knowledge	P-value
Total practice	0.451		0.000**

\*\*; highly significant at  $p < 0.001$ .

### Discussion:

Immunization is one of the most effective, safe, and cost-effective public health interventions available. While immunization has had a significant effect on childhood morbidity and mortality, its maximum potential has yet to be realized. Despite this, thousands of infants suffer per year from vaccine-preventable diseases **Alfarsi,etal. (2020)**.

Immunizations already save about three million lives per year. However, millions of infants now lack access to basic immunization and die due to diseases that could be avoided

with available vaccinations. The experience, mindset, and behaviors of mothers play a significant role in achieving full infant immunization. In 2014, an estimated 2.1 million children died across the world from infections that might have been avoided with readily available vaccinations **Khalil,etal.(2020)**

In terms of mothers' socio-demographic characteristics, the present research found that half of the mothers were between the ages of 20-30, and fewer than one-third were married. This finding disagrees with **Khalil et al. (2020)** in "Uptake of Childhood Immunization among Mothers of Children Under Five in South-

Western Nigeria," who discovered that the age of mothers has been 34.12 and that 66 percent of them were divorced.

According to the current study findings, over half of the mothers had completed high school. Over half of the mothers worked as housewives in terms of schooling, profession, consanguinity of mothers with their spouses, and monthly wages. Furthermore, the majority of them were consanguinity with husbands and had insecure, inefficient monthly income. This finding contradicts the findings of **Rachna, K., Sheetal, J., (2019)**, who stated in their study titled "Awareness and knowledge of mothers of under-five children about immunization in East Delhi, Indian" that 50 percent of the mothers had higher education and were employed, 60 percent of the mothers had consanguinity with their husbands, and 56 percent had a healthy yet inefficient income. According to the investigator, this finding may be attributed to the mothers' lives in the El Maasara district of Helwan city, which is considered a slum town.

In terms of fathers' social demographic characteristics, the current study found that the average age of fathers was  $34.3 \pm 8.6$  years, with the majority of fathers' ages falling between 20 and 30 years. In terms of standard of education and occupation, the current study found that slightly more than a third of the fathers had a high school education, and slightly more than a third of the fathers were employed. This result contrasted with **Al-Zahrani's,etal.(2019)**. research titled "Awareness, Mindset, and Practice of Parents Against Childhood Vaccination in Indians," which stated that 50 percent of fathers had higher education and 56 percent of fathers worker. According to the investigator, this finding could be attributable to the fact that most fathers in this environment serve as contract workers.

In terms of socio-demographic features of adolescents, the present research found that the average age of children was 1.76 years, and the majority of the children were male. This finding agrees with **Mabrouka et al., (2020)**, who noticed that 79 percent of the children aged 2-4 years and 46 percent of the children were

male in their study "Awareness, behavior, and practices of mothers about immunization of infants and preschool children at Al-Beida City, Libya."

As regarding child past medical history, the current study revealed that the majority of the children not admitted to the incubator after delivery, they had vaccinated with BCG vaccine after delivery, more than half of the mothers when dealing with BCG vaccine side effect keep the site where the shot was given a clean, dry and clean it by warm water, vaccinated with hepatitis B vaccine after delivery, more than half of the mothers when dealing with hepatitis B after delivery side effect use starch compress and analgesic, more than half of the children leg heel sample was investigated. More than half of the children were vaccinated with oral poliomyelitis vaccine at first 15 days from delivery. These results agree with **Mabrouka et al., (2020)**, who found that 85% of the children not admitted to the incubator after delivery and 75% of the children were vaccinated with BCG vaccine after delivery, 59% of the mothers keep the site clean, and dry after clean by warm water in dealing with BCG vaccine side effect, 88% of children vaccinated with hepatitis B vaccine after delivery, 55% of the mothers use tap water compress and analgesic with hepatitis B side effect, 77% of them were vaccinated with oral poliomyelitis vaccine in first at 15 days from delivery. According to the investigator, this finding may be due to the mother being revealed to a legal issue if the children do not comply with the full mandatory immunization schedule.

In terms of mothers' immunization awareness, the current study found a substantial increase in mothers' knowledge about context, method of immunization, and immune system following the implementation of a nursing education curriculum. The current study results indicated that most of them had the right information about the meaning and forms of immunization after the program. Furthermore, the current study found that television was the source of knowledge for over half of mothers regarding immunization, trailed by nurses in MCH centers. These findings contradicted those of **Kaljee,et al.(2018)**, who published

“Determinants of Childhood Vaccination Coverage in Kazakhstan” in a study that discovered that 75 percent of mothers might have erroneous information about the nature, immunity systems, and forms of immunization. They got their immunization information from the internet and television.

Although these findings are consistent with **Adeyinka's,etal. (2018)**, “Nursing care of infants and children in India,” who estimated that 65.7 percent of respondents get knowledge about vaccine-preventable diseases from antenatal clinics and that the position of media was only 4.8 percent of mothers get information about vaccination schedules from street advertisements rather than birth certificates.

Regarding mothers' knowledge of side effects and contraindications of immunization, the current research found a significant increase in mothers' knowledge after implementing a nursing education program regarding side effects and contraindications of immunization. The current report also discovered that over half of the mothers had correct knowledge regarding immunization. This observation is consistent with **Bofarraj et al.,(2020)**, who observed that side effects and contraindications of immunization as perceived by mothers were deformity (5%), fever (8.2%), diarrhea (2.2%), and convulsions (2.4%). According to researchers, this finding is attributed to mothers not receiving a health education and preparation curriculum for infant immunization.

Furthermore, the current research found a substantial increase in mothers' awareness of infant vaccination campaigns following a nursing education curriculum implantation. The current research found that more than half of mothers have strong awareness regarding infant vaccines in post-program campaigns. The findings mirrored (**Hamid et al., (2019)**, who found that 69 percent of mothers had demonstrated strong awareness and experience about infant vaccination in campaigns.

In terms of mother's knowledge regarding obligatory immunization, the current report found that there was a significant

increase in mother's knowledge since the implementation of a nursing education program about obligatory immunization, with over half of the report sample knowing regarding the following diseases (Measles, TB, Hepatitis B, Poliomyelitis). This contradicts the findings of a study conducted by **Birhanu et al. (2019)** titled “Knowledge, attitude and practices towards Immunizations among Mothers in a Traditional City in the United Arab Emirates,” in which they discovered that the majority of respondents (85 percent) knew about Poliomyelitis. In comparison, measles and tuberculosis were identified by 40 percent and 35 percent of respondents, respectively.

Furthermore, the results align with **Sharma,etal. (2019)**, who observed that the majority of respondents (61%) knew about measles and tuberculosis and(52.5%) knew about Hepatitis B in their study titled "Factors correlated with immunization coverage of children in Assam, India". According to the researchers, this finding may be attributed to mothers' insufficient literacy levels, which means they are unaware of the diseases for which their infant is immunized.

Regarding mothers' knowledge of non-obligatory vaccination, the current report found a significant improvement in mothers' knowledge since implementing a nursing education program on non-obligatory immunization. The majority of mothers had good knowledge of children's vaccination toward pneumococcal and Rotavirus, active BCG at four years of age. These findings contradicted **Singleton's,etal. (2018)** findings in his report titled "Impact of immunizations on the disease burden of American Indian and Alaska Native children," in which discovered a similarly high prevalence (89 percent) of hepatitis A in children who had not been vaccinated.

The findings, on the other side, contradict the findings of **Glass and Parashar (2019)** in their research titled "Rotavirus and acute diarrheal disease in children in Alexandria, Egypt," in which discovered that (65 percent) of caregivers were largely unaware of the rotavirus

vaccine. According to the investigator, this finding may be attributed to the absence of antenatal clinics and the media's involvement in raising health consciousness about the relevance and scheduling of non-obligatory vaccines by street advertisements about non-obligatory vaccinations.

In terms of mothers' knowledge of chicken boxes and meningococcal vaccines, the current study revealed a significant improvement in mothers' knowledge since implementing a nursing education program on chicken boxes, meningococcal vaccines. The majority of mothers had good knowledge of their children's vaccination against chicken boxes, meningococcal vaccines after implementing a nursing education program on chicken boxes, meningococcal vaccines. This finding is consistent with the findings of **Stefanelli & Rezza's (2018)** report, "Impact of vaccination on meningococcal epidemiology in Italy," which showed that 64.1 percent of parents had sufficient awareness of the chicken box, meningococcal vaccine.

In terms of mothers' documented immunization practices, the current research found a substantial increase in mothers' reported immunization practices in post-program nursing education programs compared to pre-program nursing education programs. According to the current report, two-thirds of the mothers had adequate treatment following BCG vaccination in the post-program. **Elbur et.al (2020)**, noticed that 55 percent of the research sample had good treatment after BCG vaccine.

In addition, mothers registered to receive treatment before and after vaccination. The present investigation discovered a significant increase in mothers' practice toward care before and after vaccination in the post-program compared to the pre-nursing education program. The present study reveals that more than half of the mothers had adequate pre- and post-vaccination care in the post-program. In a survey titled "Vaccination resistance, religion and attitudes to science in Nigeria" **Frazier et.al, (2019)**, discovered that 56 percent of the study subjects had inadequate experience in coping with children pre and post-vaccination.

However, 65 percent had adequate practice in the post-examination. According to the researcher, good results could be attributed to mothers recognizing the importance of nursing care pre and post infant immunization.

This section addressed the study hypotheses, "The mother's knowledge will increase after applying for nursing education program."

The current research found a strongly statistically important relationship between mothers' total knowledge regarding immunizations post-nursing educational program, place of residence, and marital status regarding the relationship between mothers' total awareness and socio-demographic details. Furthermore, there was a statistically relevant relationship between mothers' overall immunization awareness after completing a nursing educational program, age, and educational degree. These findings are consistent with **Ahmed et al.(2019)**, who found a statistically significant relationship between mothers' complete knowledge and socio-demographic characteristics such as marital status, residence, age, and educational level.

Furthermore, the current research found no statistically relevant connection between mothers' overall immunization awareness since completing a nursing education program and their career. This result was consistent with the findings of **Ahmed et al.,(2019)**, who discovered a statistically insignificant relationship between mothers' overall awareness of immunizations and their work.

The current research found a strongly statistically relevant relationship between mothers' overall immunization practice and their place of residence and educational degree. These findings were corroborated by **Shah et al.,(2018)** who explain a significant relationship between study sample overall practice and educational level and residence.

The current study found a statistically significant relationship between mothers' overall immunization practice and age, crowding index, profession, and monthly

revenue. However, there was no statistically significant link between mothers' overall immunization practice and marital status. These findings were consistent with **Quaiyum, (2019)** findings, who found a statistically insignificant increase in the overall scores of practice to the studied population about immunization in the post-program group compared to the pre-program group.

The current analysis found a strong correlation between mothers' total knowledge and total practice regarding immunization regarding the association between mothers' awareness and practice about immunization. Furthermore, there was a significant increase in the mother's overall awareness and total practice at post-test. These findings agreed with **Quaiyum,(2019)**, who recorded a statistically significant increase in overall scores of the research group's practice about immunization from pre-program to post-program. According to the investigator, this finding may be attributed to increased mothers' immunization awareness, reflecting on their experience with their infants.

Immunization is a societal as well as a human duty that promotes health. It was previously estimated that 5 million children died per year, and another 5 million became disabled due to infectious diseases **World Health Organization, (2020)**.

Children's success and prosperity were a long-term contribution to the country as a whole. All primary health care stresses prevention values as the secret to achieving the aim of health. Vaccines for all infectious diseases are one of the most cost-effective preventive treatments. In the treatment of babies and teenagers, vaccination is a top priority. High immunization rates have almost removed multiple infectious diseases that wipe out a large portion of a country's population. If an infant is immunized correctly at the appropriate age, many fatal and debilitating contagious diseases may be avoided. Most of these diseases can be avoided entirely or at the very least changed such that the child suffers from a minor illness with no impairment **Wongs,etal.(2019)**.

## Conclusion

According to the findings, the current study supported the research hypothesis that mothers' knowledge and practices regarding immunization requirements improve after implementing the educational program when compared to their pre-implementation scores.

## Recommendations :

The results of this research are used to include health education and immunization booklets to mothers in MCH centers, which provide information about the benefits of immunization, side effects, as well as how to handle the non-obligatory and obligatory vaccination schedules. Encourage mothers to participate in immunization group discussions and share knowledge at maternal and infant health centers under the supervision of a community health nurse.

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