



Research Paper

Knowledge of Childhood Immunization among Mothers in Umueze in Osisioma Ngwa Local Government Area of Abia State

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ABSTRACT

BACKGROUND: Childhood immunization almost guarantees protection from many major diseases, it is widely considered to be 'overwhelmingly good' by the scientific community. It averts an estimated 2.5 million deaths per year in all age groups from vaccine preventable diseases (VPD).

OBJECTIVE: To determine the knowledge of childhood immunization among mothers in Umueze in OsisiomaNgwa Local Government Area (LGA).

METHODS AND MATERIALS: A cross-sectional study performed in Umueze Community in OsisiomaNgwa (LGA) in, Abia State, Nigeria. Self/interviewer questionnaires were administered to 480 women for the study. The collected data were cleaned, coded and entered into SPSS version 26 for analysis, Binary logistic regression analyses were performed to identify variables having a significant association with maternal knowledge.

RESULT: A total of 480 women selected with a non-response rate of 30 (6.3%). Mean age was 35 ± 7.246 . Majority of mothers 264 (58.7%) got information on immunization from health workers. Majority of mothers 300 (66.7%) believed that immunization is important. Three hundred and seventy (82.0%) believed that there was a benefit of immunization, 360 (80.0%) believed that immunization was free, 350 (77.8%) believed that lack of centres was the cause of reduced child immunization, 370 (82.2%) started immunizing their children after birth, 245 (54.4%) mothers gave their children all the immunization and 235 (54.7%) knew route of administration of BCG, while 355 (78.9%) women had good knowledge of immunization. Mothers who attended primary schools and above (AOR; 5.210 $p = 0.002$), married mothers (AOR; 4.224, $p = 0.03$) Mothers age ≤ 35 years (AOR; 2.415 $p = 0.001$) were statistically associated with maternal knowledgeable of immunization. Christian mothers (2.309, $p = 0.12$) were not statistically associated with maternal knowledge of immunization.

CONCLUSION: Maternal knowledge of immunization is very important in immunization services.

KEYWORDS: Knowledge, Childhood, Immunization, Mothers, Osisiomangwa, Abia state.

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I. BACKGROUND

Childhood immunization almost guarantees protection from many major diseases, it is widely considered to be 'overwhelmingly good' by the scientific community.^{1,2} Childhood immunization is an effective public health initiative aimed at reducing the burden of vaccine preventable diseases (VPDs) and deaths among children, particularly under-fives. It averts an estimated 2.5 million deaths per year in all age groups from

Diphtheria, Tetanus, Pertussis (whooping cough) and Measles.³ Other VPDs include: Tuberculosis, Measles, Meningitis, Polio Hepatitis B and Yellow fever. These are sources of morbidity and mortality especially in developing countries, mainly in Africa and Asia^{1,2} Vaccination coverage has now reached a plateau in many developing countries, and even where good coverage has been attained, reaching children not yet vaccinated has proved difficult.⁴ Thus, there is an urgent need to look into the knowledge of childhood immunization among mothers and find ways to increase vaccination coverage and particularly encourage mothers (parents) to have their children vaccinated.

Typically, this involves exposure to an agent (antigen or immunogen) designed to fortify the person's immune system against the antigen or similar infectious agent, (i.e. active immunization).⁵ Immunization also includes providing someone with protective antibodies developed by someone else or another organism. When the human immune system is exposed to a disease once, it can develop the ability to quickly respond to a subsequent infection. Therefore, by exposing an individual to an immunogen in a controlled way, the person's body will be able to protect itself from infection later in life.⁶

Childhood immunization is an act of inducing immunity to a child by applying a vaccine that almost guarantees protection from many major diseases. Up take of vaccination service is dependent not only on provision of these service but also on knowledge of mothers, density of health workers, accessibility of vaccination clinics, availability of safe needles and syringes and the opportunity cost incurred by mothers. A good attempt to address this drawback may go a long way to improve vaccine utilization and subsequent protection of the children against childhood infectious diseases. Most mothers support immunization for their children, while some do not because they believe that administration of too many vaccines may negatively affect their children.

Child mortality has fallen significantly in many low-income countries due to introduction of appropriate vaccine for routine use in infants; however, Sub-Sahara African countries experience the slowest fall in mortality rate among children due to vaccine preventable disease. Measles is the leading cause of vaccine preventable diseases among children. 1-5% of children with measles die from complications of the disease.⁷ Tuberculosis is one of the most important infectious diseases globally. Estimation shows that thirty percent of the world populations are infected with tuberculosis. ⁷ Annually, eight to ten million people develop the disease throughout the world and over three million of these are from sub-Saharan Africa.⁷ Though the incidence on tuberculosis is not known definitely, but it has been estimated that over twenty-five thousand new cases are reported annually.⁷

Neonatal tetanus is a completely preventable disease by immunizing females before or during pregnancy or by ensuring clean delivery, proper care of the umbilical cord in the days following birth, as estimated value of two hundred and eight-nine thousand cases of neonatal tetanus continue to occur annually with the case of fatality rate averaging to seventy percent⁷. Tetanus is responsible for fourteen percent of all neonatal mortality in developing countries. The incidence in Nigeria ranges from 14.6 to 20 per 100 live births, and remain a contributor to neonatal mortality in the countries.⁷

The historical success of eradicating these dreaded diseases prompted WHO to launch the expanded program on immunization (EPI) globally in May 1974 with the focus on reducing drastically the number of deaths among children from preventable diseases by 80% by the year 1990.⁷ WHO also instructed its member countries to launch immunization against these diseases in their national Immunization Schedule. EPI was launched in Nigeria in 1971 and revised in 1984. It successfully attained the universal child immunization (UCI) target of 80% by 1990 in Nigeria as in many countries. Unfortunately, this coverage could not be sustained and there was a decline in coverage and increase in number of reported cases of the target diseases. As a way of reawakening national consciousness and demonstration of ownership of the program by Nigeria Government, EPI was renamed as National Program on Immunization (NPI) in 1996. The NPI employed the use of the four traditional EPI vaccines: Bacille Calmette Guerin vaccine (BCG), Diphtheria Pertussis Tetanus (DPT), Oral Polio virus Vaccine (OPV) and Measles containing Vaccine (MCV).⁷ The vaccines currently employed in Nigeria includes Bacille Calmette Guerin vaccine (BCG), Oral Polio virus Vaccine (OPV) and Measles containing Vaccine (MCV). Pentavalent vaccine which includes: Hepatitis B, Diphtheria Pertussis Tetanus (DPT) and Haemophilus Influenza B (HiB), meningitis.⁷

Nigeria is among the 10 countries in the world with vaccine coverage rate less than 50% being persistently below 40% since 1997.⁷ In Nigeria, over 1 million children die continually from preventable diseases making the country one of the lowest successful of African countries achieving improvement in child survival in the past four decades.⁷ The fourth millennium Development Goal (MDG) for health in 2002 set targets for nations to reduce under-five mortality rate by two-third 2015 from the base year 1990 and immunization is expected to contribute significantly to the achievement of this goal.⁷

Nigeria routine immunization schedule stipulates that infants should be vaccinated according the National Program on Immunization schedule starting from birth. This however have been characterized by intermittent failures and successes since its initiation in 1996 due to individual, community and systemic factors affecting the inequitable intake of children immunization in Nigeria and other sub-Sahara African

countries.⁷ Despite notable improvement, about three million children are permanently disabled each year due to poor coverage of immunization.⁷ Wide spread inequalities persists in immunization coverage among the children of lowest socioeconomic status, parents with no educational background and in northern Nigeria, where lack of immunization has been attributed to fear and confusion. The knowledge of childhood immunization among mothers is very important in our present society, in that they can help to protect and prevent their children from many diseases out there.⁷

The magnitude of problems and sickness arising from poor or lack of immunization of children, especially in rural areas in our contemporary society today have become a great burden and concern, and without proper intervention to these problems, the society will keep being in great menace. Lack of knowledge of childhood immunization among mothers in our society today, especially in the developing countries and rural areas had posed serious health hazards on the children.⁸ The complications arising from lack of childhood immunization include: Children are more likely to get serious illnesses, other family members are more likely to get seriously ill, they may contribute to a disease outbreak in the community, increased cost of treatment for the vaccine preventable diseases acquired and its complications, decrease in quality of life, risk of decreasing life expectancy, travel restrictions and school enrollment.⁹

This study will be relevant to Health education, promotion and community mobility. Hence findings of the research will help to know the Knowledge of childhood immunization among mothers in Umueze Autonomous Community in Osisioma Ngwa Local Government Area of Abia State. Findings of the research will also enable the health education, promotion and community mobilization sector plan programme for these mothers. It will also help to give enlightenment to pregnant women and mothers on the need to take immunization of their children seriously

The objective of this study was to determine the knowledge of childhood immunization among mothers in Umueze in Osisioma Ngwa Local Government Area of Abia State.

II. MATERIALS AND METHODS:

STUDY AREA

The study was carried out in Umueze Community in Osisioma Ngwa Local Government Area in Aba, Abia State, South Eastern Nigeria. It has 3 wards, one primary health centre and a central market. Abia State is one of the eastern states in Nigeria created on the 27th of August 1991 from the Old Imo State.¹⁰ Its administrative capital is located in Umuahia. Abia State is bordered northwards by Anambra, Enugu, and Ebonyi states, to the west by Imo State, to the east and southeast by Akwa Ibom and Cross Rivers States and to the south by Rivers State. The indigenous dwellers of the community are Igbo's whose occupation is farming. They produce yam, cassava, maize, palm oil and plantain. They are Christians of different denomination but dominated by the Seventh Day Adventist Church and orthodox churches. Osisioma Ngwa is a city found in Abia State, Nigeria. It is located 5.11 Latitude and 7.37 Longitude, and it is situated at elevation 64 meters above sea level. The LGA has an area of 198 Square Kilometer and a population of 220,662 as per 2006 census data of Nigeria projected to 289,100 at 2.7% in 2016 annual growth rate.¹¹ Its residents are made up of civil servants, business people and farmers.¹⁰

The town houses a tertiary health facility- Abia State University Teaching Hospital, with several Government and private owned primary, secondary, and tertiary institutions including a few banks, churches, industries, hotels, hospitals, etc. Notable among these are: Abayiumocham girls secondary school, Ngwa high school, St. Bridget primary and secondary school, Living word primary and secondary school, Early learning/Dority Int'l secondary school, Amazing grace academy, Abia State university primary school, Abia State Polytechnic, Covenant polytechnic, Rhema university, Udeagbala holdings limited, Sumez gas plant, The Adventist church, Living faith church, Redeemed Christian church of God, Dominion city church, Believer love world, Victoria city hotel, Binez hotel, Benidon hotel, Firapur hotel, Simeon hospital, Living word hospital, Embassy hospital, First bank PLC, Union bank, May fresh bank, Keystone bank, United Bank of Africa, etc. The notable markets in this town include: Ariaria, Ahiaohuru, Cemetary, Ahiankwo, Ahiaumungasi, ahiaafule.

The inhabitants of this city are mainly the Ngwas, which constitute the largest and most populous sub-ethnicity or clan in southeastern Nigeria. Majority of the residents are traders while the minority engage in vocations such as civil service, commercial bus driving, tailoring, shoe making, farming, patent medicine, etc. The religion mainly practiced by these people is Christianity. The tribe is the Igbo and the most common spoken language is the Igbo language followed by English.

3.4. STUDY POPULATION

This comprised of all women of Umueze Autonomous Community in Osisioma Ngwa Local Government Area of Abia State of child bearing age irrespective of their children's age.

3.4.1. INCLUSIVE CRITERIA

Women from Umueze Autonomous Community of child bearing age who have children and gave their consent for the study.

3.4.2. EXCLUSIVE CRITERIA

Women who are not from Umueze Autonomous Community and those who did not give consent for the study.

3.5. SAMPLE SIZE DETERMINATION

The sample size will be determined using the formula¹²

$$N = \frac{Z^2 \cdot P \cdot Q}{D^2}$$

Where,

N = Minimum sample size

Z = Standard normal deviate, usually set at 1.96 which corresponds in 95% confidence level.

P = Proportion with deserved characteristics = 50%

Q = I.P (Proportion in the target population not having the deserved characteristics)

D = Degree of accuracy usually set at 0.05

$$N = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2}$$

$$N = \frac{384.16 \times 0.25}{0.0025}$$

$$N = 0.96004 - 384.16$$
$$= 0.025$$

Therefore, minimum sample size (N) = 384

Adjustment for non-response, $N_s = N/\text{response rate}$

Assumed response rate = 80% i.e. 0.8

$$N_s = \frac{384}{0.8}$$
$$= 480$$
$$= 427$$

Therefore, additional questionnaire = 480 – 384 = 96

3.6. SAMPLING TECHNIQUES

The simple random technique was used. Out of 17 Local Government in Abia State, OsisiomaNgwa Local Government was selected by a simple method of balloting. The questionnaire was administered consecutively to consenting women till the sample size was reached.

3.7. DATA COLLECTION METHOD.

Data were collected through a pretested, structured, and interviewer-administered questionnaire developed from an extensive literature search and were administered to all the eligible mothers of Umueze Autonomous Community within the study period.

Data were collected by six clinical nurses who are fluent in the local language and supervised by two Resident doctors. Following this, the collected questionnaire was checked for completeness and consistency of the data by the principal investigator on a daily basis.

STUDY INSTRUMENT

Self /Interviewer administered questionnaires were used for the study and others included laptop, calculator, paper, pen and participants

METHOD OF DATA ANALYSIS

MEASUREMENT OF VARIABLES

Variables were duly measured.

STATISTICAL ANALYSIS

Data collected were entered into and analyzed using Statistical Package for Social Science [SPSS], Version 26.0. Continuous/numerical variables were summarized using mean and standard deviation, categorical variables were summarized using frequency and proportions. Binary logistic regression analysis was performed to identify variables having a significant association with maternal knowledge. Variables with a p -value of ≤ 0.05 and AOR with 95% CI were declared as having a statistically significant association during multivariable logistic regression analysis.

ETHICAL CONSIDERATIONS

Ethical approval for this work was sought for and obtained from the ethics and research committee of Abia State University Teaching Hospital, Aba. Permission was obtained from the Umunzecomunity Abayi, OsisiomaNgwa and informed consent was obtained from the participants. All information received from our respondents was handled with utmost confidentiality.

LIMITATIONS

During the interview, some women were not willing to participate in the study, gathering of participants, and collecting their responses were of great challenges, but we ensured we had a successful field work by following up the women and adequate explanations where made.

III. RESULT

A total of 480 questionnaires were distributed to the study participants but 450 participants returned their questionnaires giving 93.8% recovery which was the response rate and the findings are presented below in tables. Mean age of the respondents was 35 ± 7.246 .

Table 1: Socio-demographic characteristics

Variables		Frequency	Percentage (%)
Age group	<21	8	1.8
	21 – 27	117	26.0
	28 – 35	147	32.7
	36 – 43	76	16.9
	>44	102	22.6
Total		450	100.0
Marital status	Single	5	1.1
	Married	328	72.9
	Divorced	56	12.4
	Widowed	50	11.1
	Separated	11	2.5
Total		450	100.0
Occupation of the respondents	House wife	59	13.1
	Teaching	88	19.6
	Civil servant	53	11.8
	Farming	196	43.5
	Trading	54	12.0
Total		450	100.0
Religion	Christianity	381	84.7
	Islam	40	8.9
	Traditional religion	16	3.6
	others	13	2.8
Total		450	100.0
Highest level of education	None	8	1.8
	Primary	206	45.8
	Secondary	105	23.2
	Tertiary	141	31.2
Total		450	100.0
Spouse's level of education	None	15	3.3
	Primary	209	46.4
	Secondary	106	23.6
	Tertiary	120	26.7
Total		450	100.0
Spouse's occupation	Farming	177	39.3
	Teaching	64	14.2
	Civil servants	113	25.2
	Trading	74	16.4
	Artisan	22	4.9
Total		450	100.0
Monthly family income	#50,000.00	220	48.9
	#51,000 - #60,000	80	17.8
	#61,000 - #70,000	58	12.9
	#71,000 - #80,000	57	12.7
	#81,000 - #90,000	35	7.7
Total		450	100.0
Number of living children	1	33	7.3
	2	71	15.8
	3	220	48.9
	4	99	22.0
	>4	27	6.0
Total		450	100.0

Table 1 shows socio-demographic characteristics: Age group of the respondents shows that women of less than 21 years constituted 8 (2.0%). Women of age group from 21 to 27 years were 117 (26.0%), women of age group from 28 to 35 years were 147 (32.7%) and they were the highest in number, those from 36 to 43 years were 76 (16.9%) and those above 44 were 102 (22.6%).

Marital status of the participating women shows that single mothers (women who didn't marry but chose to have children) were 5 (11.9%), married women 308 (71.6%) which was the highest, divorced women were 16 (3.7%), widowed women were 20 (4.7%) and separated women were 9 (2.1%) which was the lowest.

Occupation of the respondents showed the women who were housewife were 59 (13.1%), women who were teachers were 88 (19.6%), Women who were civil servants were 53 (11.8%) which were the lowest, women who were farmers were 196 (43.5%) which was the highest. And trading 54 (12.0%).

Religion of the respondents shows that women who were Christians were 381 (84.7%) which was the highest, Islam was 40 (8.9%), traditional religion was 16 (3.6%) and women of other religion were 13 (2.8%) which was the lowest.

Highest level of education attained by the women shows 8 (1.8%) had none which was the lowest, women with primary education were 206 (45.8%) which was the highest, women with secondary education were 105 (23.6%), tertiary were 141 (31.2%).

Spouse's level of education attained shows 15 (3.3%) spouses had none, spouses with primary education were 209 (46.4%) which was the highest, spouses with secondary education were 106 (23.6%) and tertiary education 120 (26.7%).

Spouses' occupation shows that spouses who were farmers were 177 (41.2%) which was the highest, spouses who were teachers were 64 (14.2%), those who civil servants were 113 (25.2%), those who were traders were 74 (16.4%), those who were artisan were 22 (4.9%) which was the lowest.

On monthly family income, women with #50,000.00 were 220 (48.9%) which was the highest, women with #51,000.00 – 60,000.00 were 80 (17.8%), those with #61,000.00 – 70,000.00 were 58 (12.9%), those with #71,000.00 – 80,000.00 were 57 (12.7%), those with #81,000.00 – 90,000.00 were 35 (7.7%) which was the lowest.

On the number of children the participants had, women who had a child were 33 (7.3%), those who had two children were 71 (15.8%), those who had three children were 220 (48.9%) which was the highest, those with four children were 99 (22.0%) and those with more than four children were 27 (6.0%) which was the lowest.

Table 2: Assessment of information about infant immunization

Variables		Frequency	Percentages (%)
Assessment of information about infant immunization	From health workers	264	58.7
	Through the radio	98	21.8
	Through the town crier	20	4.4
	Television	68	15.1
Total		450	100.0

Table 2 showed the sources and assessment of mothers' information about immunization, 264 (58.7%) of mothers had access to information from health workers, 98 (21.8%) of mothers had access to information through radio, 20 (4.4%) of them had access to information through town crier and 68 (15.1%) of them had access information through television.

Table 3: Child immunization is important

Variables		Frequency	Percentage (%)
Child immunization is important	Protecting the child against infectious diseases	300	66.7
	Protecting the child from other children	43	9.6
	Making the child happy	93	20.7
	Preventing the child from crying	4	0.9
	Preventing the child against enemies	10	2.1
Total		450	100.0

Table 3 showed that 300 (66.7%) of knew the importance of immunization while the rest 150 (33.3%) did not know.

Table 4: Benefits of immunization.

Variables		Frequency	Percentage (%)
Benefits of immunization	It gives wealth	41	9.1
	Makes child lovely	22	4.9
	Prevents child from disease	370	82.2
	Increase the child's knowledge	11	2.5
	Don't know	6	1.3
Total		450	100.0

Table 4 showed that 370 (82,2%) of mothers knew the benefits of immunization

Table 5: The cost of immunization

Variables		Frequency	Percentage (%)
The cost of immunization.	Free	360	80.0
	Costly	35	7.8
	Gift item	15	3.3
	Not affordable	11	2.4
	Don't know	29	6.5
Total		450	100.0

Table 5 showed that 360 (80.0%) of the mothers knew that immunization services are free and had no cost implication.

Table 6: Causes lack of child immunization

Variables		Frequency	Percentage (%)
Causes lack of child immunization?	Lack of immunization centre	350	77.8
	Child's refusal	17	3.8
	Inadequate health facility	46	10.2
	Good roads	37	8.2
Total		450	100.0

Table 6 showed that 350 (77.8%) knew that lack of immunization centres are major cause of lack of immunization services.

Table 7: Onset of immunization of a child

Variables		Frequency	Percentage (%)
Onset of immunization of a child	At birth and afterwards	370	82.2
	When crawling started	27	6.0
	When walking started	19	4.2
	I have not started	34	7.6
Total		450	100.0

Table 7 showed that 370 (82.2%) knew the onset of immunization while others did not know.

Table 8: Number of immunizations received by a child

Variables		Frequency	Percentage (%)
Number of immunizations received by a child	Only one of them	27	6.0
	All of them	245	54.4
	Some of them	138	30.7
	Half of them	14	3.1
	None of them	26	5.8
Total		450	100.0

Table 8 showed that 245 (54.4%) of mothers knew all the immunization received by a child.

Table 9: Route of administration of BCG

Variables		Frequency	Percentage (%)
Route of administration of BCG	Right arm	164	38.1
	Left arm	235	54.7
	Buttocks	13	3.0
	Leg	9	2.1
	I don't know	9	2.1
Total		430	100.0

Table 9 showed that 235 (54.7%) of mothers knew the route of administration of BCG.

Table 10: Level of Knowledge of childhood immunization

Variables		Frequency	Percentage (%)
Level of knowledge	Good knowledge	355	78.9
	Poor knowledge	95	21.1
Total		450	100.0

Table 10 showed that 355 (78.9%) of mothers had good knowledge of immunization, greater number of the women had good knowledge, which is 78.9%, while only 21.1% had poor knowledge on childhood immunization. The reason may be that they are in urban area with many educational institutions.

Table 11: The relationship between the socio-demographic variables and level of knowledge

Variables		Odds ratio	df	Sign	Exp	95% C.I for EXP (B)	
						Lower	Upper
The relationship between the socio-demographic variables and level of knowledge	Maternal level of education ≥ Primary = None	5.210 1	1	0.002	18.210	3.024	87.531
	Marital status Married Unmarried	4.223 1	1	0.03	24.100	1.264	451.561
	Religion Christianity Others	2.309 1	1	0.12	8.236	1.043	63.045
	Mothers' age ≤ 35 >36	2.415 1	1	.001	11.184	2.025	61.784

Table 11 shows the odds ratio of mother (95% CI: 3.024 – 87.531, p = 0.002) with educational level ≥ Primary were five times more likely to be knowledgeable to childhood immunization than mothers with none, which is statistically significant.

The adjusted odds ratio of married mothers (mothers living with their spouses) were 4 times more likely to be knowledgeable than unmarried mothers (mothers living without their spouses) (95% CL: 1.264 – 451.561), P = 0.03, which is statistically significant. The adjusted odds ratio of Christian mothers (95% CI; 1.043 – 63.045 p = 0.12) were two times more knowledgeable to childhood immunization than non-Christian mothers (95% CI 1.043 – 63.045), p = 0.12. but this was not statistically significant. The adjusted odds ratio of mothers ≤ 35 years (95% CI; 2.025 – 61.784 p = 0.001) were 2 times more likely to be knowledgeable to childhood immunization than mothers with age >36 years which is statistically significant.

IV. DISCUSSION

Major source of information for mothers desiring immunization for children was from health workers 264 (58.7%), followed by radio 98 (21.8%), television 68 (15.1%) and town crier 20 (4.4%) and our findings were in consonance with a study by Fisha Alebel Gebre Eyesus et al in Ethiopia¹³ where 241 (57.7%) of the parents utilized health workers as the major source of information followed by radio while only 13.19% seek information from neighbours and friends. This is similar to a study carried out in Addis Ababa,¹⁴ Nigeria,¹⁵ Saudi Arabia,^{16,17} Pakistan,¹⁸ India.^{19,20} This may be due to mothers got delivery service at a health facility with skilled birth attendants and health care worker plays an important role, during ante-natal and post-natal clinic period by convincing mothers to link the newborn baby to Immunization unit to acquire immunization service as well as the intimate relationship between a service provider and the mothers at primary health care levels and these health facilities seem to be most readily available and accessible to the people. This is, however, contrary to studies carried out in Minia city, Egypt,²¹ Libya,²² and Nigeria,^{23,24} television, paramedical workers, and antenatal clinics were the main source of information about infant immunization, respectively.

Majority of mothers 300 (66.7%) believed that immunization is important. Three hundred and seventy (82.0%) believe that there was a benefit of immunization, 360 (80.0%) believed that immunization was free, 350 (77.8%) believed that lack of centres was the cause of reduced child immunization, 370 (82.2%) started immunizing their children after birth, 245 (54.4%) mothers gave their children all the immunization and 235 (54.7%) knew route of administration of BCG. This is consistent with study in Ethiopia¹³ where majority of the respondents 364 (87.1%) said that it was important to vaccinate breastfeeding infants and 317 (75.8%) vaccination is not harmful. Around 90% of the mothers were agreeing to immunize their baby full dose while three-fifths of them thought infants should begin an immunization program just after birth 301 (72%) of parents were knowledgeable about when they should return for vaccination. And only 148 (35.4%) of the mothers understand the side effects of vaccination

The result of our research revealed that 355 (78.9%) of the mothers had a good knowledge on childhood immunization, and this is higher than a study carried out on Knowledge of Parents About Immunization Factors in Wadla Woreda, North East Ethiopia, 2019, shows that 418 parents from March to April 2019 in Wadla Woreda, North East Ethiopia¹³ where involved, 65.1% of the parents had good knowledge. It is also higher than in study carried out in Addis Ababa (55%),²⁵ Egypt (31.2%),²⁶ Alma Dinah, Saudi Arabia (50.5%),¹⁷ south India (50.43%),²⁷ Kerala, India (39.5%)²⁸ and Lithuania (36.3%).²⁹ Nigeria, Lagos state (72%).³⁰ Nepal (72.7%)³¹ and India (72.7%).^{32,33} But it is low compared with studies conducted in Minia city, Egypt 89.2%,³⁴ Edo State, Nigeria (87%)³⁵ Jos North, Nigeria, (89.6%),³⁶ Saudi Arabia (87.2%),³⁷ The inconsistency may be due to

differences in socio-demographic characteristics, sample size, study setting, and/or educational backgrounds of the participants.

In this study, the adjusted odds ratio of mother (95% CI: 3.024 – 87.531, $p = 0.002$) with educational level \geq Primary were five times more likely to be knowledgeable about childhood immunization than mothers with none, which is statistically significant. This is consistent with a study in Ethiopia¹³ where it was recorded that literate parents who attended higher education were five times (AOR = 5.330, 95% CI: 1.919 – 14.803) more likely to be knowledgeable than illiterate respondents. This is similar to a study carried out in Alfatih one in Sudan³⁸ where it was found out that there was a significant relation between knowledge score and their level of education with p value = 0.00001, these findings were in agreement with the study done in Taif region, Saudi Arabia³⁹ which studied knowledge and childhood vaccination with p value of 0.00001 and there was also a good significant relation with knowledge score and educational level of mothers in a study done at Damietta Governorate⁴⁰. Lack of education, can lead to reduced ability to find, understand and use health information. Thus, education is an important determinant of health status in the developing world; well educated mothers had better health knowledge than the poorly educated. Furthermore, education may change mothers' knowledge and perception of the importance of modern medicine in the care of their children.

The adjusted odds ratio of mothers ≤ 35 years (95% CI: 2.025 – 61.784 $p = 0.001$) were 2 times more likely to be knowledgeable about childhood immunization than mothers with age >36 years which is statistically significant. This is consistent with other study in peri-urban Karachi⁴¹ to assess mother's knowledge about expanded programme on immunization and its relation with age – appropriate vaccination of infants which revealed a statistically significant association with age appropriate vaccine coverage which agreed with this study. This correlation between age and knowledge could be justified as the knowledge level differs from younger than older, young mothers may be interested in reading books than older mothers. There were positive statistically significant correlations between mother's age and recommendation of health education program about vaccination for mothers are needed especially for those in rural areas through TV or radio or any mass media. Encourage meetings between mothers with children in the same age to exchange information at maternal and child. Provide mothers with vaccination booklets will explain all information about vaccination.

V. CONCLUSION

Childhood immunization is an inevitable exercise that every family should be involved in, and mothers should always see to the completion of their children's immunization, in order to avert impending dangers which can result from it. In this study, Mothers had good knowledge (78.9%) towards childhood immunization, this is due to the fact that they have understood the need for their children to be immunized and prevent some killer diseases that are vaccine preventable.

VI. RECOMMENDATIONS

Concerning the practice of childhood immunization, as an add-on to Expanded Program on Immunization and National Program on Immunization, there should be an extensive awareness in primary health care centers towards childhood immunization. Nonetheless, the involvement of mothers who are already oriented and experienced in practice of child immunization should be required in the awareness programs. Immunization programs should be included as part of scheduled visit, to mothers who just delivered in different hospital facilities, and the health attendants should always see to the completion of the immunization of the children born in their facility. Massive public health education must be intensified through the provision of information, education, and communication materials to enhance the practice of parents about immunization and vaccine-preventable diseases.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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