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# Nursing mothers: Adverse events following immunization and its implication for counselling

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**ABSTRACT**

Vaccines approved for routine childhood immunization are safe and effective but sometimes there are Adverse Events Following Immunization (AEFI) which often result in ill health, various forms of deformities when it is wrongly administered and eventually forfeiture of public trust in immunization programmes. This study examined Nursing Mothers: Adverse Events Following Immunization and its Implication for Counselling. A multistage sampling procedure was used to choose 300 nursing mothers. Data were collected with the aid of a questionnaire and analyzed using means, frequency counts, percentages, Chi-square, and Pearson Product Moment Correlation (PPMC). Results revealed that the mean age of the respondents was 30 years. Pain or swelling at the injection site (85.7%) was the major existing AEFI. The majority (80.7%) of the respondents were highly knowledgeable about AEFI, while 74.0% had a negative attitude to the incidence of AEFI. The majority (68.7%) had unfavourable perception on the continuation of immunization for their children after an AEFI. The major counselling services available for nursing mothers were adherence to immunization schedules as advised by health counsellors (Mean= 2.67) and pre-counselling for nursing mothers on AEFI before child immunization (Mean =2.63). Correlation results showed that order of birth (r= 0.12), counselling services (r =0.15); awareness of nursing mothers on immunization (r=0.29) had significant relationships ($p<0.05$) with knowledge of nursing mothers on the AEFI. Also, respondents had high knowledge, negative attitude, and unfavorable perception to the incidence and continuation of immunization for Children after AEFI. In conclusion, order of birth, counselling services, and awareness of nursing mothers on immunization are crucial in shaping nursing mothers' knowledge on the AEFI. Hence, it was recommended that the Ministry of Health both should facilitate frequent counselling and immunization refresher courses for health counsellors on vaccine safety and how to control AEFI among nursing mothers.

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## INTRODUCTION

World Health Organization (WHO, 2021), Baghdadi, Younis, Suwedan, Hassounah, and Al Khalifah, 2021 and Omer *et al*, 2014, asserted that immunization is one of the greatest scientific discoveries among human race. It is among the cheapest and reliable interventions used to avert major illnesses that contribute to child morbidity and mortality globally, particularly in environments where poverty, malnutrition, overcrowding and illiteracy dominate. Also, Baghdadi, Younis, Al Suwaidan, Hassounah, 2021 also added that it is the best health investment that money can purchase because it is a major component of primary healthcare and an indisputable human right. However, WHO (2021) and United Nations International Children's Emergency Fund (UNICEF, 2021) data attested that Covid-19 pandemic influenced the low turnout in childhood vaccinations globally. For example, 23 million children missed out on basic childhood vaccines through routine health services in 2020, the highest number since 2009 and 3.7 million more than 2019 (UNICEF, 2021).

Most of the children affected lived in regions that are: susceptible to conflict, in under-served remote places, or in informal or slum settings where they face multiple deprivations and little or no access to basic health and basic social services this has left children at risk of devastating or deadly but preventable diseases like measles, polio or meningitis WHO, Director General, Ghebreyesus, 2021. Vaccination is a simple but safe and functional means of protecting individuals against harmful diseases before they contact the disease. Vaccination prevents one from getting a particular disease, they help others to live by curbing the spread of disease, it costs less than treating the disease, also it reduces epidemic if people get immunization WHO 2021; John and Adam 2020.

Currently, vaccines are important in the prevention and control of infectious disease outbreak because they support global health security and serve as a vital tool in the fight against antimicrobial resistance. Hence, vaccines to prevent over 20 life threatening diseases have been made available and have aid people to live longer and healthier irrespective of their age (UNICEF, 2021). It has also prevented 2-3million deaths yearly which could have occurred through diseases e.g., tetanus, measles, diphtheria, influenza and pertussis. Therefore, if vaccination is delayed it can lead to decrease coverage and disease outbreak. For instance, in some countries like Saudi Arabia, childhood immunization is compulsory and any negligence of childhood vaccination is seen as a breach of National Child Protection Law. Baghdadi et al, 2021. The main aim of immunization is to protect an individual or the general public from diseases that can be prevented by vaccine. Although modern vaccines are safe and potent, they are not entirely without risk because some people experience Adverse Events Following Immunization for example, mild side effects, severe illnesses or even death in some cases.

WHO, (2018) opines that an Adverse Events Following Immunization (AEFI) is any untoward medical development as a result of immunization and this might not necessarily have a causal relationship with the usage of the vaccine. AEFI can either be true adverse events or coincidental events that are not totally due to the vaccine or immunization process but are temporally associated with it, until thorough investigation is conducted. Moreso, allergic reactions are equally caused by the body's reaction to a particular component of a vaccine this rarely occurs but can be life-threatening (Immunization Advisory Centre, 2015). There are different types of immunization e.g., Bacillus Calmette Guerin (BCG), Pentavalent (PENTA), Pneumonia Conjugate Vaccine (PCV), Rota VirusVaccine (Rotarix), Measles vaccine (MV), Hepatitis B. Vaccine (HBV), among others. However, the common types of AEFI are: fever, rashes, pain or swelling, weakness, convulsion, vomiting, paralysis, and sometimes death due to infection if not properly managed (Zvanaka, Tsitsi, Chonzi, Shambira, Gombe, Tshimanga, 2017).

Adverse Events Following Immunization (AEFI) monitoring and reporting system in Nigeria is still at the rudimentary stage. There are no clear guidelines for managing AEFIs in the majority of the immunization clinics, and cases of adverse events are often mislabeled especially in malnourished infants as manifestations or complications of background condition. The awareness, knowledge and attitude of the mothers' matter when considering AEFI hence, counselling is imperative. (Patil, Tambe, Patil, 2015; Bertakis and Azari, 2011) this is because, if there is no threat from disease especially in the environment, it is certain that most mothers will not undergo immunization especially after experiencing AEFI (Kimmel, 2012); it is germane that the awareness,

knowledge and attitude of nursing mothers on the adverse events following immunization in the environment be examined and functional counselling services be provided to ease their tension.

This research was embarked on to investigate nursing mothers: adverse events following immunization and its implications for counselling in Ogun State, Nigeria. Immunization of infants and young children against serious infectious diseases is among the most successful and cost-effective interventions in health care. The success of these programmes relies on sufficiently high coverage to maintain immunity of young children. Till date, Nigeria still records rejection of child immunization by some mothers, parents, households and/or communities during the immunization programmes and it was linked to the adverse events following immunization.

Moreso, diseases that could be prevented by vaccine remain the most common cause of childhood morbidity and mortality in Nigeria. Despite the interventions of government and non-governmental organizations in combating the diseases, coverage values for all the major vaccines for children in Nigeria are still below the 80% level (WHO, 2017). The safety of immunization process, ranging from vaccine quality, its administration, to the disposal of used immunization injection equipment is a great challenge to national immunization programmes. Knowledge, attitude, belief, and behavior about vaccine safety contribute substantially to under-immunization. Immunization study showed that parents make decisions on behalf of the child and these are affected by the value systems, religious, perceptions of risk and benefit among others (Leask et al., 2012). The AEFI or rumor of Adverse Events Following Immunization are often poorly managed and if not rapidly and effectively dealt with can confuse mothers and undermine public confidence in immunization and reduction in immunization coverage and increase in the incidence of diseases. Therefore, the role of counselling is paramount in the management of adverse events following immunization. Vast researches had been conducted on attitude, knowledge and practices of nurses on Adverse Events Following Immunization (AEFI) (Tagbo & Onwuasigwe, 2015; Sadoh & Eregie, 2017; Bardenheier, Yusuf, Schwartz, Gust, Barker, Rodewald, 2014; Zvanaka, Tsitsi, Chonzi, Shambira, Gombe & Tshmanga, 2017) but there is paucity of investigation on Nursing Mothers: Adverse Events Following Immunization (AEFI) and its Implications for Counselling with emphasis on the awareness, knowledge and attitude of nursing mothers on the matter.

This research is hinged on the theory of behavior, Health Belief Model (HBM) by Champion and Skinner, (2008). It emerged from the research of several social psychologists in the 1950s, which deals with the reasons why some individuals refused to participate in Public Health Service or Preventive Healthcare Programmes such as immunization and screening that could aid with early diagnosis and prevention of diseases (Jantz & Becker, 1984; Elsevier, 2023). It is a theoretical model that can be used to improve health and prevent diseases through various available and accessible programs. It highlights and predicts reasons behind individual changes in health behavior. It is one of the models with high usage for understating health belief, attitude and behavior in human beings. It reveals that health belief, attitude and behavior in humans is subject to a combination of multifaceted reasons e.g., perceived susceptibility, perceived severity, expectation of reducing the threat by engaging in the behavior factors and the cost of accessing the behavior (Elsevier, 2023). In line with other theories exploring behavior modification or change, the HBM includes a belief component, an attitude factor and a behavior component. The belief component pertains to what the individual assesses as the true situation, while the attitude factor pertains to how the individual feels about the situation. (Shillitoe and Christie, 1989).

The six key components of this model are cognitive-based, relating the specific factors that a person who believes he is healthy must take note of when deciding on a recommended health behavior. These six components include: supposed susceptibility, perceived severity, assumed benefits, barriers, cues to action and self-efficacy.

Supposed susceptibility is purely an individual's view of the vulnerability or risk of acquiring disease. This varies from person to person.

Perceived severity on the other hand is someone's view on the gravity of contracting disease e.g. (leaving the illness or disease untreated). This depends on individual too based on the severity and the consideration of the health

consequences e.g. (disability or death) and social implication for instance, family life and social relationships of the person involved.

Assumed benefits are: (i) the perception of the individual on the efficacy of different modes of decreasing the threat of ailment or cure it. (ii) the method of preventing or curing the ailment depends on the individual's view and appraisal of the supposed susceptibility and assumed benefit, in order to accept or reject the recommended health behavior as the case may be.

Perceived barriers are what can hinder a person from accepting a recommended health action. For example, cost/benefit analysis, side effects, pain inducing, time-consuming, among others.
Cue to action refers to the stimulus required to encourage others in decision-making process to accept a recommended health action. They can be either internal or external cues.
Self-efficacy is the measure of an individual's confidence in his capacity to perform behavior successfully. (Elsevier, 2023).

As good as the model is it has the following limitations:
The model is not implicitly explanatory but descriptive and does not really suggest a strategy for changing health-related actions
It does not recognize habitual behavior
It does not consider someone's belief, attitude.
It does not take cognizance of economic or environmental facts.
The assumption of the model is that everyone has information on the illness or disease.
Another record is that cues to action are predominantly in encouraging people to act and health actions are the main fact in the decision-making process among others.

Based on the model, the awareness and knowledge of nursing mothers on adverse events following immunization and the effectiveness of counselling would influence the perception, attitude and behavior of nursing mothers on immunization. This would assist in adopting the behavior (Painter *et al*., 2010). Ideally, a nursing mother would report any AEFI to the nearest health centre or clinic where the child received the vaccination for appropriate medical assistance. However, the low rate of reporting of such incidents to health facilities indicated that some nursing mothers did not report AEFIs at health facilities for medical help as expected. They willingly dropped out of the immunization due to the unpleasant feeling of the children as a result of the AEFI or inconvenience experienced by the caregivers as children showed swelling, pain at the injection site and symptoms such as sleeplessness. This unpleasant experience the nursing mother and children might constitute a barrier to continuation of immunization (Royal Society for Public Health, 2009). For this cause, effective counselling and awareness may reduce the barrier preventing nursing mothers from continuing immunization (Brewer *et al*., 2017). This would enhance their confidence and encourage them to complete the immunization schedule. Such nursing mother are likely to be satisfied with the immunization services and assist in disseminating the usefulness of immunization program to others. They will indirectly act as behavior change agents for immunization success (Brewer et al., 2017).

## OBJECTIVES OF THE STUDY

Awareness, Knowledge and Attitude of Nursing Mothers on Adverse Events Following Immunization (AEFI) and the Implications for Counselling.

Specific objectives: describe the demographic characteristics of nursing mothers in the study area, identify the various types of existing adverse events following immunization, examine the awareness level of nursing mothers on immunization, assess the knowledge of nursing mothers on the adverse events following immunization, determine the nursing mothers' attitude to the incidence of AEFI, ascertain the perception of mothers on the continuation of immunization for their children after an adverse event following immunization and establish

different counselling services available for nursing mothers on adverse events following immunization

## MATERIALS AND METHODS

Survey research design method was used for this study and analysis was based on primary data which was generated through a structured questionnaire. According to Van Dalen (2000), the survey research design is appropriate when dealing with large samples and when the study allows for the collection and description of data which may be used to assess existing perceptions, beliefs, attitude, experiences and practices with a view to improving them where possible. The design method helps to understand better the objectives of the study through administering questionnaire, personal interviews and observations.

### Sampling Techniques

In this study, the respondents were selected by using multi stage sampling procedure.

The **first stage:** purposive selection of Odeda and Abeokuta South Local Government Areas (LGAs) due to the reported low turnout of nursing mothers during routine immunization in the two LGAs.

**Second stage:** proportionate stratified sampling technique was used to select equal fraction (0.2246 according to the sampling fraction) of respondents from each Primary Health Centres in the two Local Government Areas.

The **third stage:** random selection of 310 nursing mothers presenting their children for immunization from the twenty-four (24) Primary Health Centres (PHC) in Odeda and Abeokuta South Local Government Areas, Ogun State, Nigeria. All these Health Centres offer immunization services in line with the National Program on Immunization.

### Sample Size

Taro Yamene formula as cited by Alugbo (2002) was used to calculate the sample size which states that:

$$n = \frac{N}{1 + N (e)^2}$$

Where, n = Sample size
N = Population size
e = the square of maximum allowance for sampling error or level of significance of 5%. 1= number of items in the population

$$n = \frac{1380}{1 + 1380 (0.05)^2}$$

Sample size (n) = 310

However, 5% of the calculated sample size was added because of non-response rate. Therefore, a sample size of 325 was used for the study but only 300 samples were retrieved.

### Sample Fraction

Sample fraction was used to calculate the number of nursing mothers selected in each health centre:

$$\text{Sampling Fraction} = \frac{\text{Sample Size}}{\text{Total population}}$$

$$\text{Sampling Fraction} = \frac{310}{1380}$$

$$= 0.2246$$

Therefore, sampling fraction multiply by number of

registered nursing mothers 0.2246 x A = B

where: A = number of registered nursing mothers
B = number to be selected for sampling of registered nursing mother

.

**Validity and Reliability**

Validity is the extent the instrument measured what it ought to measure. The research instrument was subjected to face and content validity by the researchers and experts in the field. They were requested to vet items of the instrument in terms of clarity of words, appropriateness, people's feeling, perceptions, attitudes, experiences and relevance of the items to the work. All their recommendations were strictly adhered to. For the reliability, Cronbach's Alpha reliability technique was used. The instrument was adopted as reliable with coefficients higher than 0.60.

**Instrument for Data Collection**

After a thorough investigation of the instrument the university approved. A structured questionnaire was used to elicit information from respondents on the Awareness, Knowledge and Attitude of Nursing Mothers on Adverse Events Following Immunization (AEFI) and the Implications for Counselling. However, assistance was rendered to mothers who could not read and write. The questionnaire was administered directly to the respondents with the aid of two research assistants. The research instrument for the study was an adapted questionnaire with reliability coefficient of 0.70 using Cronbach's Alpha.

**Data Analysis**

Data used in this study were analyzed using descriptive statistics e.g., frequency counts, percentages, mean and standard deviation for the analyses of the objectives while Chi-square and Pearson Product Moment Correlation (PPMC) were used for inferential statistics.

**RESULTS AND DISCUSSION**

Respondents of this study were within the age range 26-35, with mean age 30.0 years. Meaning that majority of the respondents in this study were within the childbearing age, from the Yoruba ethnic group. This study revealed that is about two-third of the respondents were Christians. Majority (86.0%) of them had either tertiary education or secondary education. This showed that most of the respondents from this study were literate and can at least read, write and understand basic information being passed either in Yoruba or English. The respondents were majorly (65.4%) civil servants, artisans and traders. However, 23.0% were unemployed while 11.7% were engaged in unspecified occupation. In this study, majority of the respondents' infants presented for immunization were male with more than half being within the age range of 1-5 while majority of them were within the birth order of 1-2.

Table 1. Existing AEFI Prevalent in the study location (n=300)

| S/N | Existing Adverse Events Following Immunization | Experienced (%) | Not Experienced (%) |
|---|---|---|---|
| 1. | Pain or Swelling at the injection site | 86.7 | 13.3 |
| 2. | Fever | 79.7 | 20.3 |
| 3. | Rash | 71.3 | 28.7 |
| 4. | Weakness | 68.7 | 31.3 |
| 5. | Convulsion | 32.0 | 68.0 |
| 6. | Paralysis | 3.0 | 97.0 |
| 7. | Ulcer | 7.0 | 93.0 |
| 8. | Vomiting | 80.3 | 19.7 |
| 9. | Diarrhea | 45.7 | 54.3 |
| 10. | Headache | 83.7 | 16.3 |
| 11. | Death | 2.0 | 98.0 |

Types of AEFI in the study area include: pain or swelling at the injection site (86.7%), fever (79.7%), rash (71.3%), weakness (68.7%), convulsion (32.0%), paralysis (32.0%), ulcer (7%), vomiting (80.3%), diarrhea (45.7%). Majority of the infants' experience headache (83.7%) and death (2.0%).

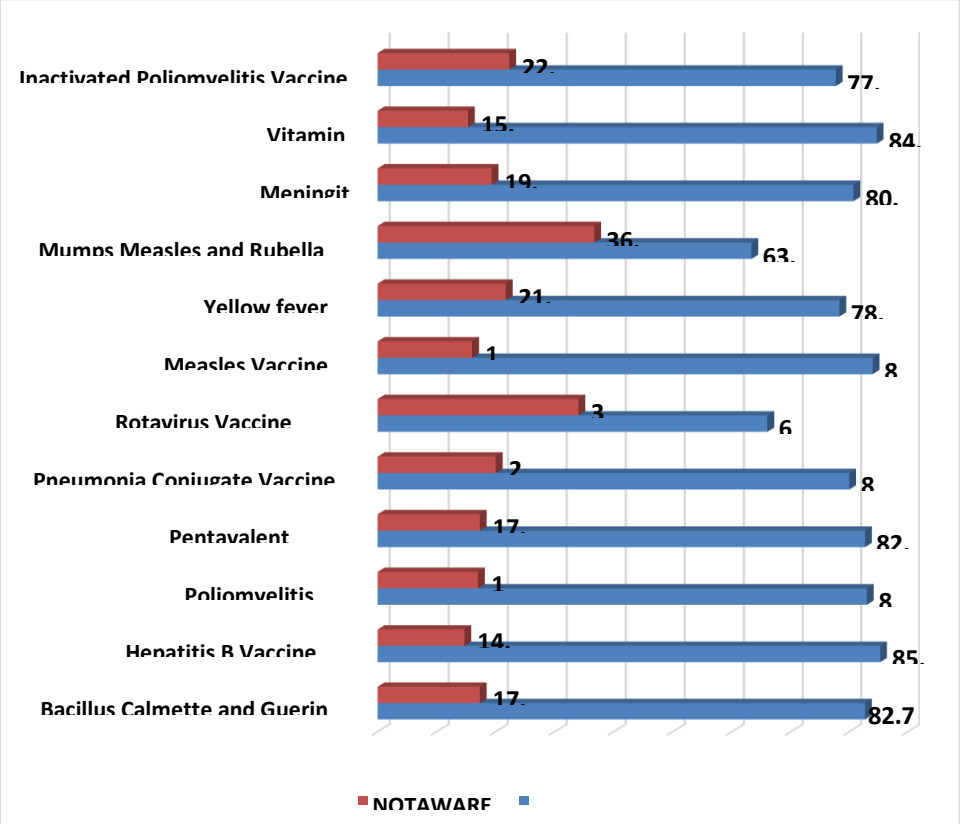


*Figure 1. Figure representation of mothers' awareness on immunization*

From the result, mothers are very much aware of immunization types in the study location ($r = 0.29$) ($p<0.05$)

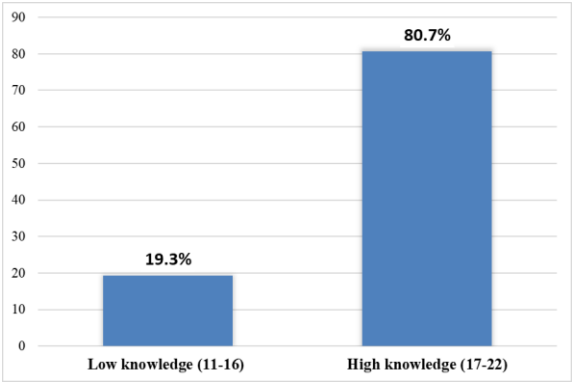


*Figure 2. Bar chart illustration of the Categorization of Nursing Mothers Knowledge on AEFI*

Result revealed that the nursing mothers had high knowledge (80.7%) on Adverse Events Following Immunization. This could be as a result of their personal experience or from other people's case in the past.

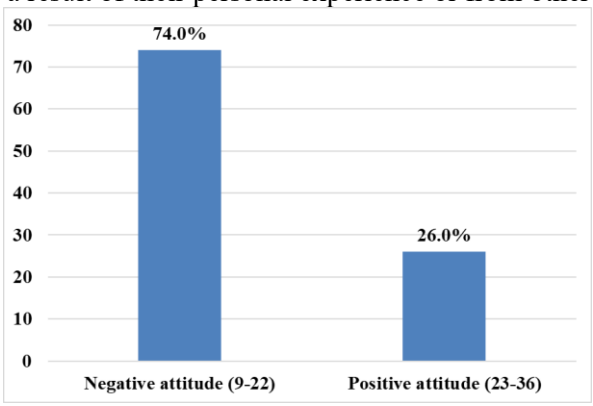


*Figure 3. Bar chart showing the Categorization of Nursing Mothers' Attitude to the Incidence of AEFI*

Result revealed that the nursing mothers had negative attitude (74.0%) to the incidence of AEFI in the study location. This can affect the turnout of people for immunization of their children in the study area.

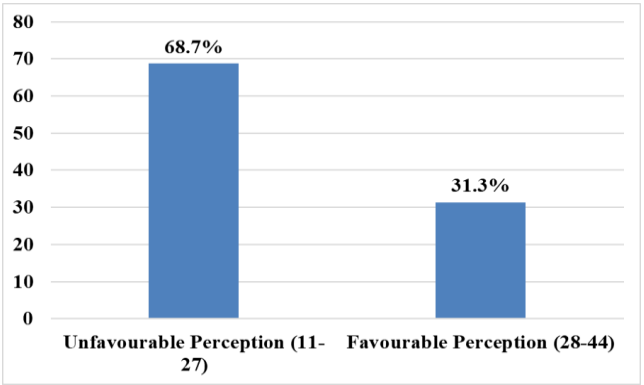


*Figure 4. Bar Chart Showing the Perception of Mothers on Continuation of Immunization Schedules Despite AEFI*

Result revealed that the nursing mothers had negative perception (68.7%) to the continuation of Immunization for their children after experiencing AEFI in the area of study. This can also hinder the people from presenting their children for immunization in the study location.

Table 2. Nursing Mothers and Availability of Counselling Services on Adverse Events Following Immunization

| STATEMENTS | ALWAYS | OCCASSIONALLY | NEVER | | S.D |
|---|---|---|---|---|---|
| I do adhere to immunization schedule as advised by Health counsellors | 58(19.3) | 20(6.7) | 222(74) | 2.67 | 0.60 |
| I am satisfied with counselling I received whenever I visit the clinic for immunization. | 51(17) | 29(9.7) | 220(73.3) | 2.64 | 0.65 |
| There is pre-counselling for nursing mothers on AEFI before Child immunization | 46(15.3) | 32(10.7) | 222(74) | 2.63 | 0.67 |
| There is safety precaution on AEFI after Immunization | 56(18.7) | 31(10.3) | 213(71) | 2.61 | 0.67 |
| There is counselling on health talk with emphasis on AEFI whenever I visit the clinic for immunization | 60(20) | 33(11) | 207(69) | 2.58 | 0.68 |
| There is follow up counselling on AEFI | 64(21.3) | 32(10.7) | 204(68) | 2.57 | 0.68 |
| There is counselling on how to manage Adverse Events Following Immunization | 66(22) | 42(14) | 192(64) | 2.50 | 0.73 |
| Referrals are made after counselling on AEFI when the need arises | 86(28.7) | 58(19.3) | 156(52) | 2.33 | 0.78 |

The table above showed the counselling services available for Nursing Mothers on Adverse Events Following Immunization. The counselling services available for nursing mothers were adherence to immunization schedules as advised by health counsellors (Mean=2.67), pre-counselling for nursing mothers on AEFI before Child immunization (Mean=2.63), counselling on health talk with emphasis on AEFI whenever they visited the clinic for immunization (Mean=2.58), follow-up counselling on AEFI (Mean=2.57) and how to manage Adverse Events Following Immunization (Mean=2.50). However, despite these services the respondents reported they never had access to them. Therefore, the respondents were not satisfied with the counselling services they received whenever they visit the clinic for immunization (r=2.64), neither was there safety precaution on AEFI after immunization (Mean=2.61) and majority also reported that referrals are not made after counselling on AEFI when the need arose (Mean=2.33).

Table 3. Test of Association on the demographic characteristics of nursing mothers and knowledge on the Adverse Events Following Immunization Using Chi-Square.

| Variables | $\chi^2$ | df | p-Value | Decision |
|---|---|---|---|---|
| Sex | 0.30 | 1 | 0.67 | Not Sig. |
| Ethnic group | 0.34 | 3 | 0.95 | Not Sig. |
| Religion | 1.07 | 2 | 0.59 | Not Sig. |
| Education level | 1.70 | 3 | 0.64 | Not Sig. |

| | | | | |
|---|---|---|---|---|
| Husband's educational level | 1.17 | 3 | 0.76 | Not Sig. |
| Mother's occupation | 3.15 | 4 | 0.53 | Not Sig. |
| Husband's occupation | 1.36 | 4 | 0.85 | Not Sig. |

From the above, no significant association ($p>0.05$) between respondents' sex($\chi^2=0.30$); ethnic group ($\times^2=0.34$); religion ($\chi^2=1.07$); educational level($\chi^2=1.70$); occupation ($\chi^2 = 3.15$); husbands' educational level ($\chi^2 = 1.17$); husband's occupation ($\chi^2 = 1.36$) their knowledge on the Adverse Events Following Immunization.
S-Significant, NS- Not Significant.

Table 4. Test of Relationship between the demographic characteristics of nursing mothers and their knowledge on the Adverse Events Following Immunization Using PPMC

| VARIABLES | r | p-Value | Decision |
|---|---|---|---|
| Age | -0.01 | 0.88 | Not Sig. |
| Infant age | -0.26 | 0.65 | Not Sig. |
| Order of birth | 0.12 | 0.04 | Sig. |

*Not Sig.- Not Significant, Sig. - Significant*

The result revealed that there is no significant relationship ($p > 0.05$) between respondents' age ($r = -0.01$); infant age ($r = -0.26$) and the nursing mothers' knowledge on the Adverse Events Following Immunization. However, there is significant ($p<0.05$) relationship between infant order of birth and respondents' knowledge on the Adverse Events Following Immunization ($r =0.12$).

Table 5. Test of Relationship between counselling services provided to nursing mothers and their knowledge on the Adverse Events Following Immunization Using PPMC (n=300)

| VARIABLE | r | p-value | DECISION |
|---|---|---|---|
| Relationship between counselling services provided to nursing mothers and their knowledge on the adverse events following Immunization | 0.15 | 0.01 | S |

S - Significant, NS - Not Significant

Table 5 revealed that there was significant relationship ($p<0.05$) in counselling services and knowledge on the Adverse Events Following Immunization ($r = 0.15$). This means that the counselling services provided to nursing mothers has a significant effect on their knowledge on Adverse Events Following Immunization.

Table 6: Test of Relationship between Awareness of Nursing Mother and their Knowledge on the Adverse Events Following Immunization Using PPMC (n=300)

| VARIABLE | r | p-Value | DECISION |
|---|---|---|---|
| Relationship between awareness of nursing mother and their knowledge on the Adverse Events Following Immunization | 0.29 | 0.00 | S |

S- Significant, NS-Not Significant

Table 6 showed that there was significant ($p<0.05$) relationship in awareness of nursing mothers on immunization ($r = 0.29$) and knowledge on the Adverse Events Following Immunization. This means that the awareness has significant effect on the knowledge of mothers on AEFI. Majority (60.0%) of the respondents of this study were in the age bracket of 26-35, with the mean age 30.0 years. This showed that majority of the nursing mothers in this study were within the childbearing age, were from the Yoruba ethnic group and about two-third of the participants were Christians. The educational level of the participants showed that majority (86.0%) of them have either tertiary education or secondary education. This shows that most of the respondents from this study were literate. 23.0% were unemployed while 11.7% were engaged in unspecified occupation, majorly civil servants, traders and full housewives. This is similar to the work of Nnenna, Davidson and Babatunde (2013). In this study, majority of the respondents' infants presented for immunization were male with more than half being within the age range of 1-5 while majority of them were within the birth order of 1-2.

Reports on the various types of existing Adverse Events Following Immunization (AEFI) likely to be experienced by respondents' infants in this study showed that significant percentage of these infants had experienced one or more AEFI. The respondents said their infants do experience fever, pain or swelling at the injection site, rash, among others. The AEFI detected in this study were comparable to those found by Kimmel (2012); Aderibigbe, Osagbemi and Bolarinwa (2010) and Ogunyemi and Odusanya (2016) who independently reported redness and/or pain at the injection site, swelling, fever, rash, excessive crying, among others. However, significant percentage of respondents said their infants do not experience paralysis, ulcer, diarrhea and death. This negates the report of Ogunyemi and Odusanya (2016) who reported seizure and death also.

Mothers' awareness on immunization from this study showed significant percentage of respondents were aware of all immunization programs. This supported the findings of Nnenna et al. (2013); Akunuri and Dayal (2016) reported that mothers knew why children are immunized and the awareness and knowledge on immunization have influenced immunization uptake. The findings from this study negate the report of Sharma et al. (2008) showed that nursing mothers were not aware of immunization programs. Their seemingly high literacy level might have influenced the knowledge on immunizing children in this study.

Responses of nursing mothers on statements of AEFI showed that majority of them have high knowledge (80.7%) on events that can occur after an immunization. This result is in line with the work of Ogunyemi & Odusanya (2016) who found high knowledge among sampled respondents. However, reports from this finding revealed that respondents have poor attitude to the incidence of AEFI. This supported the findings of Constantine et al. (2018) which attested to the poor attitude among nursing mothers towards the incidence of AEFI. However, it negates the study of Nnenna et al. (2013) who reported that most mothers are of the opinion that immunization should continue despite the occurrence of adverse events and that experiencing the adverse reactions were better than being affected by the diseases. One would have imagined why the respondents from this study have a negative attitude (74%) despite their high knowledge on immunization and awareness on AEFI. According to Nnenna et al. (2013), a poor attitude towards the incidence of AEFI negatively impact immunization coverage. These mothers could influence the choice of other mothers not to immunize their children leading to a rise in vaccine preventable diseases in Nigeria.

This study revealed that respondents have a very poor perception (68.7%) on the continuation of immunization for their children after an AEFI. This finding is similar to what were reported by Ekwueme (2009) and Abdulraheem, Onajole and Oladipo (2011) but negates the work of Nnenna et al. (2013), who found that majority (80.0%) of the respondents would still partake in immunization even if the child is affected by an adverse event. Respondents reported that they are not satisfied with the counselling services they received whenever they visit the clinic for immunization (r= 2.64). They confirmed that there was no pre- counselling for nursing mothers on AEFI before child immunization (r= 2.63), neither is there safety precaution on AEFI after immunization (r= 2.61). Respondents reported that there is no counselling on health talk with emphasis on AEFI whenever they visited the clinic for immunization (r= 2.58), neither is there follow-up counselling on AEFI (r= 2.57) or on how to manage Adverse Events Following Immunization (r= 2.50). Majority also reported that referrals are not made after counselling on AEFI when the need arises (r= 2.33). This supported the findings of Maurici et al. (2019). This inadequacy of counselling on AEFI to the respondents in this study is likely to be the reason for their poor perception and attitude to the continuity of immunization after AEFI. Poor communication and counselling increase the risk of refusal (Simone *et al.*, 2012) by nursing mothers for their infants to be immunized.

The test of relationship revealed that there was no significant relationship between demographic characteristics of respondents and their knowledge on the Adverse Events Following Immunization. This corroborated the work of Nnenna et al. (2013) who in their findings reported that there was no significant association between maternal occupation and education level and knowledge of mothers on AEFI. However, there was a significant relationship ($p < 0.05$) between respondents' infant order of birth and respondents' knowledge on the Adverse Events Following Immunization. Respondents from this study are highly knowledgeable on AEFI while the order of birth of respondents are within 1-2. This means that infant's order of birth has significant effect on the knowledge of mothers on AEFI.

The test of relationship between counselling services provided to nursing mothers and their knowledge on the Adverse Events Following Immunization revealed that there was a significant relationship between counselling services provided to nursing mothers and their knowledge on the Adverse Events Following Immunization ($p=0.01$). According to this study, respondents are highly knowledgeable on AEFI. This means that the counselling services provided to nursing mothers has a significant effect on their knowledge on Adverse Events Following Immunization. However, respondents had earlier reported that there was no pre-counselling on AEFI before immunization, the counselling from this context must have been the usual health talks given to nursing mothers on immunization. Health talks given to mothers during antenatal care or at first immunization visit must be thorough and details of possible adverse events that may follow should be properly communicated to reduce dropout rates.

The test of relationship from this study indicated a significant relationship ($p<0.05$) in the awareness of nursing mothers on immunization and their knowledge on the Adverse Events Following Immunization. Results from figure 1 revealed that significant percentage of respondents are aware of immunization given to their infants in health clinics. This means that awareness has significant effect on the knowledge of mothers on AEFI

## CONCLUSION AND RECOMMENDATION

In conclusion, order of birth, counselling services provided to nursing mothers, awareness of nursing mother were positive predictors of their knowledge on the Adverse Events Following Immunization.
Based on the result of this study, the following recommendations were highlighted:

1. The health authorities should monitor the safety of all kinds of immunization, the quality of vaccine and administration.
2. Information regarding After Events Following Immunization should be rapidly and effectively disseminated to nursing mothers to manage and prevent wrong notions about AEFI which can undermine public confidence in immunization.
3. There is also a need to consider complementing the health talks with counselling services where nursing

mothers can be rightly informed about After Events Following Immunization. A trained health counsellor or a clinical psychologist is needed to effectively carry out this duty.

## REFERENCES

Abdulraheem, I., Onajole, A., & Oladipo A. (2011). Reasons for Incomplete Vaccination and Factors for Missed Opportunities among Rural Nigerian Children. Semanticscholar.org/paper/

Aderibigbe, S.A., Osagbemi, G.K., & Bolarinwa, O.A. (2010). Adverse event following immunization in a Nigerian tertiary health institution. *American Journal Science and Industrial Resolution*, 1(3), 496-499.

Akunuri, S. & Dayal, A. (2016). What do parents think? Knowledge and awareness about newer vaccines: A cross-sectional study in South Indian City. International Journal of Contemporary Pediatrics.

Baghdadi, L. R., Younis A., Al Suwaidan, H.I., Hassounah M.M., & Al Khalifah R. (2021). Impact of Covid-19 pandemic lockdown on routine childhood immunization: A Saudi Nationwide Cross Sectional Study. Frontiers in Pediatrics, 9, 692877. https://doi.org/10.3389/fped.2021.692877

Bardenheier, B., Yusuf, H., Schwartz, B., Gust, D., Barker, L. Rodewald, L. (2014). Are Parental Vaccine Safety Concerns Associated with Receipt of Measles-Mumps-Rubella, Diphtheria and Tetanus Toxoids with Acellular Pertussis, or Hepatitis B Vaccines by Children? *Archives Pediatric Adolescent Medicine, Vol.158,* 569-575

Bertakis, K.D. & Azari, R. (2011). Patient-centered care is associated with decreased health care utilization. *J Am Board Fam Med*, 24, 229-39.

Champion, V. L., & Skinner, C. S. (2008). The health belief model. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), Health behavior and health education: Theory, research, and practice (pp. 45-65). San Francisco: Jossey-Bass.

Constantine, M., Cremance, T., Juru, T.P., Gerald, S., Notion, G.T., Peter, N., & Mufuta, T. (2018). Evaluation of the Adverse Events Following Immunization Surveillance System in Guruve District, Mashonaland Central 2017. *The Pan African Medical Journal*, 29. doi: 10.11604/pamj.2018.29.233.14550

Elsevier, B.V. (2023). Health Belief Model. Science Direct, Commentary

Ekwueme, O. (2009). Adverse Events Following Immunization: Knowledge and experience of mothers in immunization centres in Enugu State, Nigeria. *International Journal of Medicine and Health Development*. DOI: 10.4314/JCM.V14|1.44854

Ghebreyesus, T. A. (2021). Even as countries clamour to get their hands on Covid-19 vaccines… World Health Organization. https://www.who.int/director-general/speeches/detail/even-as-countries-clamour-to-get-their-hands-on-covid-19-vaccines

Immunization Advisory Centre. (2015). Adverse Events Following Immunization (AEFI). University of Auckland. Retrieved from http://www.immune.org.nz/adverse-events-following-immunization-aefi.John Pope and Adam Husney, (2020). Importance of Immunization. University of Michigan Health. Michigan Medicine.

Kimmel, S.R. (2012). Vaccine adverse events: separating myth from reality. American Family Physician, 66, 2113-2120.

Leask, J., Kinnersley, P., Jackson, C., Cheater, F., Bedford, H., & Rowles, G. (2012). Communicating with parents about vaccination: A framework for health professionals. BMC Pediatrics, 12, 154. https://doi.org/10.1186/1471-2431-12-154

Maurici, M., Arigliani, M., Dugo, V., Leo, C., Pettinicchino, V., Arigliani, R., & Franco, E. (2019). Empathy in vaccination counselling: A survey on the impact of a three-day residential course. Human Vaccines & Immunotherapeutics, 15(3), 682-688. https://doi.org/10.1080/21645515.2018.1554172

Nnenna, T. B., Davidson, U. N., & Babatunde, O. I. (2013). Mothers' knowledge and perception of Adverse Events Following Immunization in Enugu, South- East, Nigeria. *Journal of Vaccines and Vaccination*, 4(2), 202.

Ogunyemi, R. A. & Odusanya, O. O. A. (2016). Survey of knowledge and reporting practices of primary healthcare workers on adverse experiences following immunization in Alimosho local government area, Lagos. *Nigeria Postgraduate Medicine Journal*, 23, 79-85.

Omer, S.B., Salmon, D.A., Orenstein, W.A., deHart, M.P., & Halsey, N. (2014). Vaccine refusal, mandatory immunization, and the risks of vaccine-preventable diseases. *New England Journal of Medicine*, 360(19), 1981-1988.

Patil, S.P., Tambe, M.P., & Patil, P J. (2015). Effect of immunization counselling skills training in third-year medical students. *International Journal of Medical Science Public Health*, 4

Sadoh, A.E. & Eregie, C. O. (2017). Continuing barriers to optimum immunization uptake in Nigerian Children: the role of missed immunization opportunities and inappropriately timed immunizations. *Nigerian Journal of Paediatrics*, 34, 57-61.

Sharma, R. & Bhasin, S. (2008). Routine immunization - Do people know about it? A study among caretakers of children attending pulse polio immunization in East Delhi. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*. https://doi.org/10.4103/0970-0218.39240

Simone, B., et al. (2012). Healthcare workers' role in keeping MMR vaccination uptake high in Europe: A review of evidence. Eurosurveillance, 17(26). WHO. (2013). The guide to tailoring immunization programmes (TIP). Increasing coverage of infant and child vaccination in the WHO European Region.

Shillitoe, R. W. & Christie, M. J. (1989). Determinants of self-care: The health belief model, Holistic Medicine, 4, 3-17.

Tagbo, B.N. & Onwuasigwe, C. (2015). Missed opportunity among children in Enugu. Nigerian Journal of Paediatrics, 32, 73-76.

UNICEF. (2021). Covid-19 pandemic leads to major backsliding on childhood vaccination. https://www.unicef.org.

World Health Organization (2013). Adverse Events Following Immunization

World Health Organization. (2017). World health statistics 2017: Monitoring health for the SDGs, sustainable development goals. https://apps.who.int/iris/handle/10665/255336 (CC BY-NC-SA 3.0 IGO)

World Health Organization. (2018). SAGE issues its 2018 assessment report of the Global Vaccine Action Plan. Immunization, Vaccines and Biologicals. https://www.who.int/immunization/global_vaccine_action_plan/SAGE_GVAP_Assessment_report_2018.pdf

World Health Organization. (2021). Vaccines and Immunization. https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1

Zvanaka, S., Tsitsi, J., Chonzi, P., Shambira, G., Gombe, N.T., & Tshimanga, M. (2017). Evaluation of the Adverse Events Following Immunizations surveillance system in Harare City, Zimbabwe, 2016: A descriptive cross-sectional study. *Pan African Medical Journal*, 28, 308.