

## Original Research Article

# Influence of maternal factors on the immunization status of under- five in Ebonyi state

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## ABSTRACT

**Background:** Poor delivery of childhood immunization with the interacting factors has been a significant public health challenge especially in the sub-Saharan Africa. Nigeria has been presented as one of the countries with the worst under-five mortality rates, and factors affecting childhood immunization including maternal factors are poorly understood. The study determined the influence of maternal characteristics and immunization status of under-five children in Ebonyi State.

**Methods:** Data were collected using an Immunization Status Checklist (ISC). The population of the study was 572,955 under-five children in Ebonyi State from which 2865 was sampled. Data were analyzed using percentages and chi-square.

**Results:** The findings of the study revealed that 83.01% of under-5 children were fully immunized. The chi-square analysis shows a significant influence of mothers' parity at ( $p < 0.05$ ), mothers' occupation at ( $p < 0.05$ ) and mothers' use of antenatal services at ( $p < 0.05$ ).

**Conclusions:** The study concluded that immunization status of under-five children in Ebonyi State was high and maternal characteristics had significant influence on immunization status of under-five children. Thus, recommended that government should provide tangible incentives to mothers who fully immunized their children and promulgate a law to prevent children without immunization cards showing full immunization from registering in public and private primary schools.

**Keywords:** Childhood immunization, Ebonyi State, Maternal characteristics

## INTRODUCTION

Poor delivery of childhood immunization with some interacting factors has been a significant public health issues globally especially in low and middle income countries.<sup>1,2</sup> Nigeria has been presented as one of the

countries with the worst under- five mortality rates and factors affecting childhood immunization including maternal factors has been poorly studied.<sup>3,4</sup> Maternal immunization is a cost-effective method of protecting mothers and children from some vaccine-preventable

diseases which are significant causes of morbidity and mortality.<sup>5</sup>

Immunization is the first line of action against vaccine preventable diseases and one of the most effective health benefits available to children for reducing under-5 mortalities.<sup>6,7</sup> In Nigeria, vaccine-preventable diseases (VPD) are known to account for 22% of childhood death amounting to over 200 000 children per annum.<sup>8-10</sup> About 87% of post-neonatal mortality can be tackled by addressing malaria, pneumonia, and diarrhea and improving immunization. The incidence of disabilities, including mental retardation, hearing loss or deafness, meningitis, intellectual disability as well as mobility impairment, has been greatly reduced by immunization polio as well as rubella, meningitis, measles, diarrhea and pneumonia.<sup>1</sup> To guarantee children full protection against vaccine-preventable diseases, care-givers (mothers) need to be mandated to taking the provided vaccines at the right time.

Research has reported that children before the age of 2 years should be fully immunized against 14 potentially deadly diseases which include polio, rubella, hepatitis, measles, yellow fever, tuberculosis, pertussis tetanus, and rotavirus among others.<sup>11</sup> Also, WHO planned a 9-month vaccine plan for infants at their priming age of life such as Bacilli Calmette Guerin (BCG), Oral Polio Vaccine (OPV), Hepatitis B vaccine (HBV), Hemophilus Influenza B vaccine, Diphtheria, Pertussis and Tetanus (DPT), inactivated polio vaccine (IPV) Measles vaccine and Yellow fever vaccine.<sup>12,13</sup> The underlying goal of the immunization schedule is to achieve effective, lasting immunity against vaccine-preventable diseases.<sup>3,13</sup>

In spite of its innumerable potential and overwhelming evidence of the benefits of childhood immunization, existing data in Nigeria shows that there have been only small improvements in vaccination coverage in the country resulting to high neonatal and under-five morbidity and mortality.<sup>14</sup> For instance, in 2015, an estimated 19.4 million infants globally were not reached with routine immunization services and about 60% of these children live in Sub Sahara Africa particularly in Nigeria.<sup>15,16</sup> Evidences has shown that Nigeria has one of the worst mortality rates for under five children, (109 per 1000 live births) in the world. Although there is a dearth of research data in Nigeria, however, Professor Adenike Grange while quoting official hospital records in 2011, stated that about three million babies die within 1 week of birth, two million on the first day of birth and nearly 1 million before five years and most of these deaths are preventable.<sup>17</sup>

Empirical evidence has shown that maternal characteristics has a significant relationship with immunization status of under-five, greater health awareness and consequently improved general well-being of their children, thus improving the survival rate of the children.<sup>16-19</sup> Despite the researchers reports and other

overwhelming evidence of maternal factors towards improving the immunization status of under- five, factors interacting with poor childhood immunization status are not well known in Nigeria particularly in Ebonyi State.<sup>4,20</sup> As biologically, socially, and culturally recognized primary caregivers, it is imperative to critically examine the role of mothers' characteristics on immunization uptake of their children in Ebonyi State. Ebonyi State was cited as one of the States with moderate to no gain immunization coverage rate of less than 40% between 2008 and 2010.<sup>21</sup> Studies have estimated that children requires full immunization up to 90 per cent nationally, with at least 80 percent coverage in each state including Ebonyi State.<sup>22</sup>

Against these estimates for Nigeria, child immunization coverage rate continues to be very low, especially in Ebonyi State.<sup>3</sup> The situation of immunization programme makes it imperative for health care delivery systems to identify why there is poor immunization coverage in Nigeria.<sup>23</sup> The researcher feels that one of the measures of closing immunization gap is by studying the influence of maternal factors on the immunization status of under- five in Ebonyi State. The present study attempt to evaluate the influence of mothers' parity, mothers' occupation and mothers' use of antenatal services on the immunization status of under- five in Ebonyi State. Moreover, there was little or no empirical evidence that such a study has been conducted in Ebonyi State hence the present study. Therefore the objective of this study was to investigate the influence of maternal characteristics such as mothers' parity, mothers' occupation and mothers' use of antenatal services on the immunization status of under- five in Ebonyi state.

The following hypotheses were specifically tested at 0.05 level of significance. 1) There is no significant influence of mothers' parity on immunization status of under-five children in Ebonyi State, 2) There is no significant influence of mothers' occupation on immunization status of under-five children in Ebonyi State, 3) There is no significant influence of mothers' use of antenatal services on immunization status of under-five children in Ebonyi State.

## METHODS

### Research design

A descriptive cross sectional research design was conducted between August 2022 to January 2023 to investigate the influence of maternal factors on the immunization status of under- five in Ebonyi State.

### Area of the study

The study was conducted in Ebonyi state which was created from the old Enugu and Abia States on 1<sup>st</sup> October 1996. It is one of the states in the South- East Zone of the Federal Republic of Nigeria.<sup>24</sup> Ebonyi State

occupies a land mass of 5,539 square kilometers, with a population of 2,864,776. The state lies on approximately latitude 7° 30'E to 8° 30'E and longitude 5° 40'N to 6° 45'N. It is bordered in the east by Cross River State, in the North by Benue State, in the west by Enugu and in the south by Abia State. The indigenes are mainly farmers with few traders and civil servants.<sup>24</sup>

The present study on the association between maternal characteristics and immunization status of under- 5 children in Ebonyi State is important because, Ebonyi State was one of the States rated between 2008 and 2010 as having less than 40% immunization coverage gain.<sup>21</sup> Considering the pivotal roles of mothers in the immunization of their children and the large proportion of under-five children in Ebonyi State (572,955).<sup>25</sup> It is important to undertake the present study in the State. Health programmes including immunization among such a large population of children should be of interest to health educators. Further, immunization status of this age group and the associated maternal characteristics is important in measuring the immunization programme performance in Ebonyi State.

### **Population of the study**

The population of the study comprised all 572,955 under-five children in Ebonyi State. This information was sourced from the National population commission 2016 Ebonyi State Population Projected from 2006.<sup>25</sup>

### **Sample and sampling techniques**

The sample of the study was 2865. This was derived by using 0.5% of the population as suggested by Nwana that 0.5% could be used for a large population.<sup>26</sup> Multistage sampling procedure was employed in the study. In the first stage, purposive sampling technique was used to select 3 urban Local Government Areas (LGAs) from the 3 senatorial zones in the state. The selected LGAs were Abakaliki, Ezza South and Afikpo North. These LGAs were the only gazetted urban LGAs in the state. In the second stage, random sampling of balloting without replacement was used to select 3 other LGAs namely Ohaukwu, Ikwo and Ohaozara making a total of 6 LGAs. This sampling method was adopted because the researcher made use of location of residence as a variable. In the third stage, random sampling of balloting without replacement was used to pick 2 wards from each of the 6 selected LGAs which gave a total of 12 wards which was used to divide 2865 giving a total of 239 per ward. In the fifth stage, households with under-five children were selected alternately (1 in every 5) for the required number of under-five children.

### **Instrument for data collection**

The instrument for data collection was an immunization checklist. The instrument was adapted from the routine immunization supportive checklist in Nigeria. Child's

immunization cards were utilized to extract information on the immunization status for all the vaccines prescribed in the immunization schedule. This instrument was deemed necessary owing to the retrospective nature of the study. The checklist was used to extract data sighted from the children's immunization cards from where their immunization status was established. A child was ranked as fully immunized (FI) if he/she received all vaccines prescribed in the immunization schedule, partially immunized if started but not completed (PI) and not immunized if no vaccine was given (NI). The immunization cards supplied the evidence of immunizations taken by a child and utilized in the collection of data for the study to avoid self-report by mothers for the most reliable outcome.

### **Validity of the instrument**

After constructing the checklist, samples of it with the research objectives, and research questionnaire were presented to five experts in the departments of Human Kinetics and Health Education and Science Education Ebonyi State University, Abakaliki for face validation. The experts studied the items on the checklist in order to establish their relevance to the objectives of the study. After the corrections and suggestions, with the approval of the dissertation supervisor, the final copy was produced and used for the study.

### **Reliability of the instrument**

The use of checklist and immunization card became necessary in the present study for the authenticity of the study. The use of immunization cards to verify the immunization status of a child is necessary as both overestimation and underestimation are possible depending on the maternal tendencies exhibited with regards to immunizations.<sup>27</sup> The latest national immunization coverage survey which was carried out in 2010, reported that 53.01% of the children were fully immunized using card and history. However, only 18.38% were verified by card.<sup>28</sup> The instrument was not tested for reliability because, it was a checklist adapted from current immunization supportive checklist Nigeria and child immunization card.

### **Method of data collection**

A letter of introduction from the Head, Department of Human Kinetics and Health Education Ebonyi State University was used to introduce the researcher to the village head and Officers in Charge (OICs) of immunization in the selected LGAs. This was to allow the researcher have access to the wards and for the cooperation of the OICs. With the permission of the OICs, the researcher utilized the Local Immunization Officers (LIOs) and Disease Surveillance and Notification Officers (DSNOs) in each selected LGA as research assistants for the study.

In order to guarantee a high response rate and ensure that mothers were available for the study, information about the study was spread through the locally recruited town criers. The traditional birth attendants, members of the community based organization and market women assisted greatly in mobilization through information dissemination. The inclusion criteria were mothers of under-five children residing in Ebonyi State 5 years prior to the study and also had immunization cards. This was because within five years, a child was expected have been fully immunized. The under-five children without immunization cards were classified as not immunized.

The researcher had a forum with LIOs and DSNOs where they were instructed on how to collect the data. Data collection involved two stages; in the first stage, the LIOs and DSNOs identified households with mothers of under-five children in each of the selected wards. In the second stage, the researcher, the LIOs and DSNOs in each LGA collected the data per LGA. This approach was necessary as the researcher, the LIOs and the DSNOs were filling the checklist from the children's immunization cards. Data were collected from all the six selected LGAs.

### Method of data analysis

Out of the 2865 copies of the checklist distributed, 2655 copies were returned showing a response rate of 92% of the sample which was deemed fit for the study. Number of the checklist not returned was 210 representing only 7% of the sample. From the 2655 returned copies 7 copies were rejected. The reason for not returning the checklists was due to inaccessibility of some parts of the LGAs especially as the data was collected in June/July during the peak of the raining season. The rejected copies were due to ineligibility of the prints which were blurred by rain drops. The valid 2648 copies were used for data analysis.

The valid copies were analyzed using both descriptive and inferential statistics. Frequency and percentage were used to answer research questions while chi-square ( $\chi^2$ )

was used to test the hypotheses at 0.05 level of significance. The result were illustrated using tables.

## RESULTS

Table 1 shows that 83.01% of under-5 children are fully immunized, 8.27% partially immunized and 8.72% not immunized suggesting a high immunization status of under-five children in Ebonyi State.

Table 2 reveals that 76.40% of under-five children born to mothers with 1 child had full immunization, 19.72% partial and 3.78% not immunized. The result also shows that 92.03% of under- fives born to mothers with 2 children were fully immunized, 4.81% partially immunized and 3.16% not immunized. Further, 89.50% of under-five children from mothers with 3 children had full immunization, 4.36% partial and 4.04% not immunized. The table indicates that 71.43% under-fives born to mothers with 4 children had full immunization, 4.69% partial and 17.91% not immunized. Finally, 6.71% of under-fives from mothers with 5 children and above had full immunization, 0.86% partial and 2.42% not immunized. These results indicate that the highest under-five children to get full immunization were 92.03% of under- five children from mothers with two children followed by 89.50% of under- five children from mothers with 3 children and 76.40% of under- fives from mothers with 1 child. The least under-fives to get full immunization were 6.71% of under- five children from mothers with 5 children and above followed by 71.43% of under- fives from mothers with 4 children.

**Table 1: Immunization status of under-five children in Ebonyi state (n = 2648).**

| Immunization status of children | Responses (%) |
|---------------------------------|---------------|
| <b>Fully immunized</b>          | 2198 (83.01)  |
| <b>Partially immunized</b>      | 219 (8.27)    |
| <b>Not immunized</b>            | 231 (8.72)    |
| <b>Total</b>                    | 2648 (100)    |

**Table 2: Influence of mothers' parity (number of children) on the immunization status of under-five children in Ebonyi State.**

| Mothers' parity      | Immunization status of children |            |            | Total (%)  |
|----------------------|---------------------------------|------------|------------|------------|
|                      | Responses                       |            |            |            |
|                      | FI (%)                          | PI (%)     | NI (%)     |            |
| 1 Child              | 384 (76.40)                     | 99 (19.72) | 19 (3.78)  | 502        |
| 2 Children           | 727 (92.03)                     | 38 (4.81)  | 25 (3.16)  | 790        |
| 3 Children           | 554 (89.50)                     | 27 (4.36)  | 25 (4.04)  | 619        |
| 4 Children           | 335 (71.43)                     | 22 (4.69)  | 84 (17.91) | 469        |
| 5 Children and above | 180 (6.71)                      | 23 (0.86)  | 65 (2.46)  | 2681       |
| Total                | 2189 (100)                      | 219 (100)  | 231 (100)  | 2648 (100) |

FI = fully immunized, PI = partially immunized, NI = not immunized

Table 3 indicates that 79.96% of under-fives from housewives were fully immunized, 8.86% partially and 7.38% not immunized. Also, 88.16% of under- fives from

skilled workers were fully immunized, 7.24% partially and 4.61% not immunized. Further, 81.88% of under-fives born to traders were fully immunized, 10.70%

partially and 1.71% not immunized. The result indicates that 78.34% of under-fives from farmers got full immunization, 5.27% partial and 16.38% not immunized. Further, 83.54% of under-five children born to civil servants were fully immunized, 8.44% partially and 7.41% not immunized. The result indicates that the

highest number of under-five children to be fully immunized were 88.16% from skilled workers followed by 83.54% from civil servants and 81.88% from traders. The least number of under-five children with full immunization were 78.34% from farmers and 79.96% from housewives.

**Table 3: Influence of mothers' occupation on immunization status of under-five children in Ebonyi State.**

| Mothers' occupation | Immunization status of children |            |            | Total (%)  |
|---------------------|---------------------------------|------------|------------|------------|
|                     | Responses                       |            |            |            |
|                     | FI (%)                          | PI (%)     | NI (%)     |            |
| House wives         | 379 (79.96)                     | 42 (8.86)  | 35 (7.38)  | 474        |
| Skilled workers     | 402 (88.16)                     | 33 (7.24)  | 21 (4.61)  | 456        |
| Traders             | 574 (81.88)                     | 75 (10.70) | 12 (1.71)  | 701        |
| Farmers             | 416 (78.34)                     | 28 (5.27)  | 87 (16.38) | 531        |
| Civil servants      | 406 (83.54)                     | 41 (8.44)  | 36 (7.41)  | 486        |
| Total               | 2189 (100)                      | 219 (100)  | 231 (100)  | 2648 (100) |

FI = fully immunized, PI = partially immunized, NI = not immunized

**Table 4: Influence of mothers' use of antenatal services on immunization status of under-five children in Ebonyi State.**

| Mothers' use of antenatal services | Immunization status of children |            |            | Total (%)  |
|------------------------------------|---------------------------------|------------|------------|------------|
|                                    | Responses                       |            |            |            |
|                                    | FI (%)                          | PI (%)     | NI (%)     |            |
| Yes                                | 2,076 (83.74)                   | 198 (7.99) | 205 (8.27) | 2479       |
| No                                 | 122 (72.19)                     | 21 (12.43) | 26 (15.38) | 169        |
| Total                              | 2189 (100)                      | 219 (100)  | 231 (100)  | 2648 (100) |

FI = fully immunized, PI = partially immunized, NI = not immunized

**Table 5: Summary of Chi-square analysis of mothers' parity and immunization status of under-five children in Ebonyi State.**

| Variables           | Parity (number of children) |             |             |             |             | Total         | $\chi^2$ -value | df | p     | Dec |
|---------------------|-----------------------------|-------------|-------------|-------------|-------------|---------------|-----------------|----|-------|-----|
| Immunization status | 1                           | 2           | 3           | 4           | 5 and above |               |                 |    |       |     |
| FI                  | 384 (416.7)                 | 727 (655.7) | 545 (5138)  | 353 (389.3) | 180 (222.5) | 2198 (2198.8) |                 |    |       |     |
| PI                  | 99 (14.5)                   | 38 (65.3)   | 27 (51.2)   | 32 (38.8)   | 23 (22.2)   | 219 (219.0)   | 294.847         | 8  | 0.000 | S   |
| NI                  | 19 (43.8)                   | 25 (68.9)   | 38 (54.0)   | 84 (40.9)   | 65 (23.4)   | 231 (231.0)   |                 |    |       |     |
| Total               | 502 (502.0)                 | 790 (790.0) | 619 (619.0) | 469 (469.0) | 268 (268.0) | 2648 (2648.0) |                 |    |       |     |

FI = Fully Immunized, PI = Partially Immunized, NI = Not Immunized

Table 4 indicates that 83.74% of under-fives from mothers who had antenatal services got full immunization, 7.99% partial and 8.27% not immunized. Further, 72.19% of under-fives from mothers who did not receive antenatal services had full immunization, 12.43% partial and 15.38% not immunized. The result implies that children born to mothers who utilized antenatal services were fully immunized (83.74%) more than children from mothers who did not utilize antenatal services (72.19%).

Table 5 shows that shows that the  $\chi^2 = 294.847$  with df = 8 is significant at  $p < 0.05$ . Therefore, the hypothesis which stated that there is no significant influence of

mothers' parity on immunization status of under-five children is rejected. Therefore, there is a significant influence of mothers' parity on immunization status of under-five children in Ebonyi State.

Table 6 indicates that  $\chi^2 = 62.534$  with df = 8 is significant at  $p < 0.05$ . This implies that the hypothesis stating that there is no significant influence on mothers' occupation on immunization status of under-five children in Ebonyi State is rejected. Thus, there is a significant influence of mothers' occupation on immunization status of under-five children in Ebonyi State.

Table 7 reveals the  $\chi^2=15.495$  with  $df = 2$  is significant at  $P < 0.05$ . This means that the hypothesis which stated that there is no significant influence of mothers' use of antenatal services and immunization status of under-five

children in Ebonyi State is rejected. Thus, there is a significant influence of mothers' use of antenatal services on immunization status of under-five children in Ebonyi State.

**Table 6: Summary of chi-square analysis of mothers' occupation and immunization status of under-five children in Ebonyi State.**

| Variables           | Mothers' occupation (%) |                |             |            |               | Total         | $\chi^2$ -value | df | p     | Dec |
|---------------------|-------------------------|----------------|-------------|------------|---------------|---------------|-----------------|----|-------|-----|
| Immunization status | House wife              | Skilled worker | Trader      | Farmer     | Civil servant |               |                 |    |       |     |
| FI                  | 397 (93.4)              | 402 (378.5)    | 474 (581.9) | 416 (4408) | 404 (403.4)   | 2198 (2198.0) |                 |    |       |     |
| PI                  | 42 (39.2)               | 33 (37.7)      | 75 (58.0)   | 28 (43.7)  | 41 (40.2)     | 219 (219.0)   | 62.534          | 8  | 0.000 | S   |
| NI                  | 35 (41.3)               | 21 (39.8)      | 52 (61.2)   | 87 (46.3)  | 36 (42.4)     | 231 (231.0)   |                 |    |       |     |
| Total               | 474 (1.2)               | 456 (10.9)     | 701 (6.5)   | 531 (42.9) | 486 (1.1)     | 2648 (62.1)   |                 |    |       |     |

FI = Fully Immunized, PI = Partially Immunized, NI = Not Immunized

**Table 7: Summary of chi-square analysis of use of antenatal services and immunization status of under-five children in Ebonyi State.**

| Variables           | Mothers' Local of Residence |             | Total         | $\chi^2$ -value | Df | p     | Dec. |
|---------------------|-----------------------------|-------------|---------------|-----------------|----|-------|------|
| Immunization status | Urban                       | Rural       |               |                 |    |       |      |
| FI                  | 2076 (2057.7)               | 122 (140.3) | 2198 (2198.0) |                 |    |       |      |
| PI                  | 198 (205.0)                 | 21 (14.0)   | 219 (219.0)   | 15.495          | 2  | 0.000 | S    |
| NI                  | 205 (216.3)                 | 26 (14.7)   | 231 (231.0)   |                 |    |       |      |
| Total               | 2479 (2,479.0)              | 169 (169.0) | 2648 (2648.0) |                 |    |       |      |

FI = Fully Immunized, PI = Partially Immunized, NI = Not Immunized

## DISCUSSION

### *Immunization status of under-five children in Ebonyi State*

The present study revealed that 83.01% of under-five children were fully immunized. The finding indicates that the immunization status in Ebonyi State was high drawing from the 2015 Ebonyi state immunization coverage target of 85% and an expected national immunization coverage of 80% minimum.<sup>29,30</sup> This high immunization status may be attributed to the frequent immunization campaigns ongoing at the time of the study. Thus, such activities like house-to-house immunization, state immunization days may have helped to beef up Ebonyi State immunization status. The findings is in agreement with the report who assess vaccination coverage and its determinants in children aged 11-23 months in Enugu metropolis. The results of the study revealed that among the children surveyed, 84.9% completed all the vaccinations, indicating a high immunization status among the study group. The present finding also supports the study who revealed relatively high immunization coverage among the study group.<sup>31</sup> The finding of the present study that a greater number of under-five children were fully immunized in Ebonyi State supports the findings in Ojo Local Government Area, Lagos State which revealed an increased uptake (92.5%) of immunization.<sup>32</sup> The finding of high

immunization status of under-five children in the present study is also in consonance with the study that reported high immunization status found among children less than one year (85.48%).<sup>33</sup>

The present study however differs from the findings who reported that only 61.7% children were fully immunized in rural Bangladesh.<sup>34</sup> It also varies from the study who observed that 62.8% representing two third of the study population were not fully immunized showing a low immunization status.<sup>30</sup> Also, differs from low immunization status reported from the study conducted to assessed immunization coverage and factors affecting immunization status of children aged 12-23 month.<sup>35</sup>

### *Influence of mothers' parity on immunization status of under-five children in Ebonyi State*

The present study revealed that parity of mothers is influenced by the immunization status of under-five children in Ebonyi State. The result showed an inconsistent trend in full immunization status of children among different levels of mothers' parity. However, the finding indicates that the highest immunization was found among mothers with 2 children. Generally, it could be inferred that less immunization rate was observed as parity of mothers increased. This observation was envisaged because mothers with fewer children are not cumbered with as much responsibilities as not to take care of their children especially health-wise.

On further analysis using chi-square to analyze the influence of mothers' parity on immunization status, the result in hypothesis one revealed a significant influence of mothers' parity on immunization status with  $\chi^2 = 249.847$  significant at  $p < 0.05$ . The finding that mothers with 2 children had the highest full immunization for their children yields credence to the observations of the study who reported that mothers with 2 and less children were more likely to complete recommended vaccine for them.<sup>36</sup> The finding that there was decreased immunization rate as parity of mothers increased is also in agreement with Sarab, Abedalrahman, Ruquiya and Tawfeek who observed that caring for multiple children can impose a barrier to vaccination of their children.<sup>36</sup>

The finding that mothers of 2-3 children fully immunized their children more than mothers with 1 child is surprising because mothers with one child logically should have lesser responsibilities which should afford them better opportunity to immunize their children more those with more children. However, this finding varies with the findings of Elizabeth, Mary, Abigail and Sussan who observed that in the United States of America, mothers with 2-3 children were less likely to fully immunize their children more than mothers with 1 child.<sup>37</sup> The variation in the two findings could be as a result of the different settings where the studies were done.

It was also observed that mothers with 1 child had more immunization for their children more than mothers with 4 to 5 children and above. The finding is envisaged because mothers with just one child are more likely to have lesser responsibilities and more proactive in attending to the health needs of their children than those with more children. Further, the finding is expected because though immunization is free, other factors such as cost of transportation and delays in the health facility could be hindrances. This finding agrees with the study who observed that mothers with 4 or more children were 40% less likely to immunize their children than those with only 1 child.<sup>37</sup> This finding also aligns with the findings of several studies who observed that when parity is higher, the likelihood of mothers getting full immunization for their children declines.<sup>35,38-40</sup> The reason according to them was due to much inconvenience experienced by mothers of high parity due to depletion of resources.

This could be the case of mothers in Ebonyi State. Mothers of high parity may be having depletion of resources in taking adequate care of many children including health care. These categories of mothers could be pre-occupied fending for their children. In such a situation, getting health care for children may stop at seeking for medical treatment for a sick child and not for immunization. A general downward trend in full immunization as mothers' parity increased in the present study has an implication for health educators to design a programme that will consider the different levels of mothers' parity. The implication of this finding also demands that health policy makers should design and

implement immunization policies that will enable every woman to get full immunization for her children irrespective of her parity.

### ***Influence of mothers' occupation on immunization status of under-five children***

The study indicated that mothers' occupation is influenced by immunization status of under-five children in Ebonyi State. Thus, the finding that the highest to fully immunize their children were skilled workers was not surprising. The reason for this finding may be that the skilled workers had more time out of their jobs than civil servants and other categories of workers. This finding shows that mothers' occupation is vital in the immunization of under-five children. The implication for this finding is that mothers' occupation should be considered while designing health education intervention strategies towards improving the immunization status.

The chi-square analysis results in Table 5 hypothesis two indicated a significant influence of mothers' occupation on immunization status with  $\chi^2 = 62.534$  significant at  $p < 0.05$ . The result is in line with the findings of most reviewed studies. For instance, mothers' occupation was the only factor that associated with full childhood immunization in south Nigeria. Mothers' occupation significantly associated with their children's immunization.<sup>41</sup> Women were employed in private organizations and professionals fully immunized their children more than women who were in other sectors such as civil service.<sup>16</sup>

The findings of the present study that housewives who were not employed were among the least to fully immunize their children. This finding is expected because most housewives are not economically empowered and are equally occupied with much house chores. This finding may be the reason why Oyefara observed that high economic status significantly associated with full childhood immunization.<sup>16</sup> The implication of this finding is that inadequate economic empowerment and time factor may have caused the low immunization rate observed among under-five children of housewives. This implication suggests that researchers should investigate the reasons for the low immunization status among the children born of mothers who are housewives. This finding agrees with the findings who in their separate studies observed that women with high social and economic empowerment use their resources to provide good health services for their children.<sup>18,19,32</sup> Further, the finding is in line with the findings of Oyefara who observed that women who engaged in trade and craft (skilled work) were 0.321 likely to fully immunized their children as much as women working in private organization.<sup>32</sup>

The finding that civil servants had better immunization for their children than farmers agrees with the findings who reported that civil servants were 5(95%, CI: 1.1,22)

more likely to immunize their children than farmers.<sup>37</sup> This finding is expected because civil servants are more exposed to media for information on immunization activities. This finding has the implication for health educators to direct their intervention strategies that will encourage farmers to get more information on immunization of their children. The finding that farmers immunized their children more than house wives in the present study varies from the findings of the study who observed that farmers were 0.4 (95% CI: 0.23, 0.71) times less likely to immunize their children than house wives.<sup>37</sup> The finding that civil servants immunized their children more than farmers supports the findings of the study who reported that civil servants were 2-3 times more likely to fully immunize their children more than non-civil servants in Enugu state.<sup>42</sup> The similarity in the two studies could be that Ebonyi and Enugu State have a common geographic location. The finding that mothers' occupation had a significant association with their children's immunization status differs from the findings of the study who reported that mothers' occupation had no significant relationship with full immunization of their children.<sup>43</sup> Generally, the implications of the variations in the immunization status among different categories of workers call for further investigation by researchers.

#### ***Influence of mothers' use of antenatal services on immunization status of under-five children in Ebonyi State***

The study observed that mothers' utilization of antenatal services had an influence on the immunization status of under-five children in Ebonyi State. Chi-square analysis on influence of mothers' use of antenatal services and immunization status also revealed that there was a significant influence of mothers' use of antenatal services and immunization status. This finding was envisaged since mothers who attended antenatal clinics in pregnancy had the opportunity of being taught the benefits of childhood immunization. They also had the opportunity of being immunized with tetanus toxoid and probably had a high probability of hospital delivery. These factors are likely indices of childhood full immunization. This finding indicates the importance of mothers' use of antenatal services in full immunization of under-five children. The finding therefore has the implication health educators working harder to encourage mothers to have greater value in the immunization of their children. Expectedly, the present findings supported the findings of most previous studies reviewed. It is also reported that children who were delivered at home were 2.27 times less likely to complete immunization course.<sup>44</sup> This assertion was based on the premise that mothers who had hospital delivery must have received antenatal services. Other studies also affirmed that maternal use of antenatal services improves childhood immunization status.<sup>37,45,46</sup> These authors reported that association between women and their children regarding health care seeking and immunization were properly documented during antenatal period.

Supporting the present study also, Swignonski, skinner and Wolinsky reported that maternal use of antenatal care was associated with prompt administration of childhood immunization.<sup>47</sup> It is also observed that lack of antenatal services for mothers contributed to delayed immunization among his study population.<sup>48</sup> Expectedly, none of the studies reviewed expressed a different view from the finding of the present study.

## **CONCLUSION**

In conclusion, it has been observed from the result of the study that maternal factors plays a significant influence on the immunization status of under-five in ebonyi state. Thus, the study revealed that under-5 children were fully immunized due to the significant influence of mothers' parity, mothers' occupation and mothers' use of antenatal services towards the immunization of under-5 children. The study concluded that government should provide more incentives to mothers to enable them sustain the immunized of their children and promulgate a law to prevent children without immunization cards both in public and private primary schools in Ebonyi state.

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