

**Supplement 1:** Reasons mothers of zero-dose (unvaccinated) children gave for not vaccinating their children

Reasons	Frequency N = 68	Proportion (%)
◦ I was busy with other things	1	1.5%
◦ Child was too sick to receive vaccines	3	4.4%
◦ I did not know the schedule for vaccination	8	11.8%
◦ There were no vaccines in our health facility	26	38.2%
◦ My religion forbids vaccination	1	1.5%
◦ Vaccination site is too far	29	42.6%

**Supplement 2:** Comparing vaccine-specific coverage rate and FIC rate on the Enugu sub-set of 2018 Nigeria DHS dataset using DHS's and current study's definitions

Vaccine-specific coverage rate	Current study	Authors' calculations from 2018 Nigeria DHS using DHS definition	Authors' calculations from 2018 Nigeria DHS using current study's definition
◦ BCG	90.6%	92.8%	92.8%
◦ Measles	87.8%	80.4%	80.4%
◦ DPT	--	74.3%	--
◦ Pentavalent 3	83.9%	--	80.4%
◦ OPV	--	44.3%	--
◦ Polio (tOPV; or bOPV + IPV)	83.1%	--	89.6%
<b>FIC rate</b>	<b>78.9%</b>	<b>32.3%</b>	<b>68.1%</b>

tOPV = Triple OPV doses; bOPV = two OPV doses

**Supplement 3:** Comparing socio-demographic characteristics of mothers in the current study with mothers in the Enugu sample of the 2018 Nigeria DHS

Socio-demographic characteristics	Current study sample (N = 1,254)	2018 DHS Enugu sub-set (n = 105)	p-value
<b>Mothers' age</b>			0.089
◦ < 20 years	54 (4.3%)	2 (1.9%)	
◦ 20 – 29 years	602 (48.0%)	42 (40.0%)	
◦ ≥ 30 years	598 (47.7%)	61 (58.1%)	
<b>Marital status</b>			0.097
◦ Single	50 (4.0%)	7 (6.7%)	
◦ Currently married	1127 (89.9%)	96 (91.4%)	
◦ Divorced/Separated	77 (6.1%)	2 (1.9%)	
<b>Educational status</b>			0.001
◦ Primary or lower	77 (6.1%)	15 (14.3%)	
◦ Secondary or higher	1177 (93.9%)	90 (85.7%)	
<b>Mothers' occupation</b>			< 0.001
◦ Stay-at-home/Housewife	307 (24.5%)	47 (44.8%)	
◦ Working mom	947 (75.5%)	58 (55.2%)	
<b>Religion</b>			0.198
◦ Christian	1214 (96.8%)	104 (99.0%)	
◦ Others	40 (3.2%)	1 (1.0%)	
<b>Ethnicity</b>			0.498
◦ Igbos	1201 (95.8%)	102 (97.1%)	
◦ Others	53 (4.2%)	3 (2.9%)	
<b>Birth order of child</b>			< 0.001
◦ First born	347 (27.7%)	23 (21.9%)	
◦ Second/Third born	625 (49.8%)	37 (35.2%)	
◦ Others	282 (22.5%)	45 (42.9%)	
<b>Residence</b>			< 0.001
◦ Urban	751 (59.9%)	84 (80.0%)	
◦ Rural	503 (40.1%)	21 (20.0%)	

## Study Interview guide

### Factors associated with incomplete immunization in children aged 12 to 23 months at sub-national level, Nigeria – a cross-sectional study

#### \*\*INSTRUCTIONS\*\*

1. Seek permission from the mother to participate before you commence. If mother is < 18 years old, seek permission of the husband (if mother is < 18 years old and married) or mother's mother/father (if mother is < 18 years old and single)
2. If more than two children in the age bracket, only interview for the youngest child more than 12 months of age
3. Always be polite and courteous throughout the interview. NEVER Shout. NEVER Criticize.
4. Please complete ONE questionnaire for one/each child

#### Section A: Sociodemographic Data

1. Local Government Area: \_\_\_\_\_
2. Cluster or Ward: \_\_\_\_\_
3. Mother's age
  - a. < 20 yrs
  - b. 20 – 24 yrs
  - c. 25 – 29 yrs
  - d. 30 – 34 yrs
  - e. ≥ 35 yrs
4. Marital status
  - a. Single
  - b. Married
  - c. Divorced
  - d. Widow
5. Mother's education
  - a. None
  - b. Primary
  - c. Secondary
  - d. Tertiary
6. Mother's Occupation
  - a. Stay-at-home/Housewife
  - b. Farmer
  - c. Civil Servant
  - d. Trader
  - e. Artisan
7. Tribe/Ethnicity
  - a. Igbo
  - b. Hausa/Fulani

- c. Yoruba
- d. Igala
- e. Others

**8. Family religion**

- a. Christian
- b. Islam/Muslim
- c. African Traditional Religion

**9. Family monthly income**

- a. < N 40,000
- b. N40,000 to N79,999
- c. N80,000 to N119,999
- d. ≥ N120,000

**10. Sex of child**

- a. Female/Girl
- b. Male/Boy

**11. Birth order in the family**

- a. First born
- b. Second or third born
- c. Others

**Section B: Prevalence & Determinants****1. Has your child been vaccinated?**

- A. YES
- B. NO

**>> If YES to Q1 above, when was your child vaccinated?**

- A. At the appropriate age
- B. Later than appropriate date

**2. Please where is the Immunization card? Is the mother able to provide the card?**

- A. YES
- B. NO

**>> If mother is NOT able to provide the card, Why?**

- A. Mother cannot find it during interview
- B. Mother lost card before interview, i.e. could not find the card before the day of interview
- C. Mother was not given any immunization card at health centre

**3. How many antenatal care visits did you attend while pregnant for this child?**

- A. None, I did not attend any antenatal clinic
- B. Only one visit
- C. Two visits
- D. Three visits
- E. Four visits or more

4. **How many TT injections did you receive during pregnancy?**
- A. None, I did not receive any TT injection
  - B. One injection
  - C. Two or more injections
12. **Where did you deliver this child?**
- A. In a hospital
  - B. With Traditional birth attendants (TBA)
  - C. At home
5. **Did you attend any post-natal care consultation after delivering this child?**
- A. YES
  - B. NO
6. **Where did you hear of vaccination?** (Please tick all that apply)
- A. Hospital/Health facility
  - B. Family/friends
  - C. Church/Mosque
  - D. TV
  - E. Radio
  - F. Social media (Facebook, Twitter, WhatsApp, Instagram)
7. **What does vaccination do to your child's body?**
- A. Vaccination prevent illnesses in children
  - B. Vaccines treat illnesses in children like drugs
  - C. Vaccines provide nutrients to children like food
  - D. I do not know
8. **Please mention any disease vaccination can prevent:**  
(Use this list to assess mothers' response: Tuberculosis, Diphtheria, Whooping cough, Tetanus, Poliomyelitis, Hepatitis B virus infection, Measles, Pneumococcal pneumonia)
- A. Mother mentions four (4) or more diseases
  - B. Mother mentions three (3) or fewer diseases
  - C. I do not know any diseases vaccination can prevent
9. **When do you start to vaccinate a child?**
- A. Just after birth
  - B. 1 week after birth
  - C. 2 weeks after birth
  - D. 1 month after birth
  - E. Anytime
  - F. I do not know
10. **When does a child complete his routine vaccination?**
- A. 6 months
  - B. 9 months
  - C. 12 months (1 year)

- D. 15 months
- E. 2 years
- F. 5 years
- G. I do not know

11. **Do you know the right age or schedule for routine vaccination of infants?**

*(Use vaccination schedule on the paper titled, 'NPHCDA routine immunization schedule' to assess mothers' response)*

- A. Mother mentions correct schedule for three (3) or more vaccines
- B. Mother mentions correct schedule for one or two vaccines
- C. I do not know

12. **How many visits are needed to complete the immunization for a child**

- A. One (1) visit
- B. 2 or 3 visits
- C. 5 or 6 visits
- D. I do not know

13. **Using the Google Map app on your phone, how far is the nearest vaccination centre to this house?**

- A. Less than 30 mins walk
- B. About or more 30 mins' walk

**Section C: Immunization status**

If you answered YES to Question 1 above, which of these vaccines has he/she received?

**Step 1:** FIRST, ask the mothers to know how many vaccinations she can recall, and tick accordingly

**Step 2:** Then, cross check with the Vaccination/Immunization Card, if available, and tick accordingly

S/n	Vaccine	Age	1). Mothers recall		2). Immunization Card	
			YES	NO	YES	NO
1	BCG	At birth				
2	OPV-1	6 weeks				
3	OPV-2	10 weeks				
4	OPV-3 or Polio vaccine	14 weeks				
5	Pentavalent – 1	6 weeks				
6	Pentavalent – 2	10 weeks				
7	Pentavalent – 3	14 weeks				
8	Vitamin A	6 months				
9	Measles vaccine	9 months				
10	Yellow fever	9 months				

**\*\* The END \*\***

Thank the mother profusely .... Daalu nnukwu / Thank you very much!!