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Immunization status and its determinants among children of female traders in Ibadan, South-Western Nigeria

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Summary

Traders form a large percentage of the female work force in Nigeria and may spend long hours at work, thereby putting their children at risk of inadequate immunization. The study assessed primary immunization completion rate and the determinants of immunization status among the children of female market traders in Ibadan, South-Western Nigeria. A cross-sectional community-based survey was carried out in Bodija market among female traders who had children aged 12 to 23 months. The subjects were selected by systematic random sampling and data collected with an interviewer administered semi-structured questionnaire. Logistic regression was used to estimate the predictors of incomplete immunization for the socio-demographic variables. A total of 418 women were interviewed. Ninety two percent worked ≥ 6 days a week and 78.5% had their children with them in the market all the time. Full immunization by both card and history was recorded in only 40.7% while 8.4% children had never been immunized. The highest vaccine coverage was seen with BCG (91.4%) while Hepatitis B (1%) had the lowest coverage. DPT1 to DPT3 vaccine drop out rate was 32.1%. All the immunizations were received in health facilities. The immunization coverage rate among children of female traders was low. Routine immunization sites should be made available in the markets.

Keywords: *Child, immunization status, vaccine coverage, determinants, female traders, Ibadan, Nigeria*

Résumé

Les commercantes forment un pourcentage élevé des femmes actives au Nigéria et peuvent passer de longues heures au travail, laissant ainsi leurs enfants au risque d'immunisation inadéquate. Cette étude évaluait le taux d'immunisation primaire complète et

les déterminants du status immunitaire parmi les commercantes à Ibadan, sud ouest du Nigeria. Une section de la communauté surveillée était faite au marché Bodija parmi les femmes commercantes ayant les enfants de 12 à 23 mois. Systématiquement, Les sujets étaient sélectionnés au hasard et les données collectées à l'aide d'un questionnaire sémi structurée. La régression logistique était utilisée pour estimer les prédicteurs de l'immunisation incomplète/partielle pour les variables socio-démographiques. Au total 418 femmes étaient interviewées. 92% travaillaient ≥ 6 jours par semaine et 78.5% avaient leurs enfants avec eux au marché. L'immunisation complète par la carte et l'histoire était enregistré chez 40.7% alors que 8.4% d'enfants n'étaient pas immunisés. La couverture la plus élevée du vaccin était avec le BCG (91.4%) et Hépatite B (1%) avait la plus faible couverture. Le taux d'échec des vaccins DPT1 au DPT3 était de 32.1%. Toutes les immunisations étaient obtenues aux centres des soins de santé. Le taux de couverture d'immunisation parmi les enfants des commercantes était faible. Les sites d'immunisation routinier devraient être disponibles aux commercantes.

Introduction

Vaccine-preventable diseases cause an estimated 2 million deaths or more each year, of which approximately 1.5 million deaths occur among children under five. These 1.5 million deaths represent approximately 15 per cent of under-five deaths [1]. In Nigeria, 22% of childhood illnesses are reported to be vaccine preventable [2]. Immunization with the subsequent reduction in vaccine preventable diseases has been identified as the most effective, low cost method of reducing childhood mortality [3]. By convention, the success of routine immunization programmes has been measured by the coverage achieved with the third dose of diphtheria–Pertussis–Tetanus vaccine (DPT3) among children aged 12–23 months [4].

Information on immunization levels, trends and the distribution of vaccination services across districts is used to monitor immunization performance at the local, national and international levels and to guide efforts at polio eradication, measles control and neonatal tetanus elimination [1]. The immunization coverage survey 2003 report of the Nigerian National Programme on Immunization (NPI) was adjudged the largest and most comprehensive immunization survey in the history of Nigeria. The report showed that the national coverage rate of 12.7% as the proportion of children aged 12 – 23 months who had been fully immunized with valid doses of scheduled antigens by the age of 52 weeks while the crude rate using history alone was 32% [5].

One of the constraints on immunization is that mothers may not be willing to leave their jobs for numerous visits to the health facility with an apparently healthy child. As such, their children may miss out on the routine immunization. In the NPI survey, one of the predominant reasons for immunization failure in the Southwest Zone Nigeria where Ibadan belongs was that “mother too busy” [5]. As a result of the long hours that market women spend at work, their children may not avail of the opportunities for routine immunization services offered in the health facilities. This problem is not peculiar to women traders in Nigeria as Kobayashi *et al*, in their survey of children under 5 years in Niger Republic found that 76.3% of the children had received Oral Polio Vaccine (OPV) through National Immunization Days (NIDs) while only 7.5% had received the vaccine through routine immunization and BCG coverage was only 25.6% [6]. A similar study in China also showed that indices of immunization were low among children of market traders who moved along with their children [7]. Similar report from Haiti showed that carrying the tetanus immunization services to the market places resulted in a sharp reduction in the number of admissions to the hospital for the treatment of tetanus [8].

Immunization coverage rates are usually estimated based on routine figures that are derived from tally sheets filled in at the health facility. Population-based surveys conducted periodically for special purposes may also serve as a source of data for estimating coverage. Immunization surveys are useful because they can show which subgroups of the population are not getting immunized and the reasons for non immunization. In addition it would enable the underserved population to be identified. However, only a few studies have been carried out in Nigeria on children of traders in relation to the

health indices of the children. This study was therefore carried out to determine the immunization status of the children of female market traders between the age of 12 and 23 months and the association between the socio-demographic variables and the status.

Materials and methods

Study design and scope

A descriptive cross sectional survey was carried out among female traders in Bodija market in Ibadan, who had children between the ages of 12 and 23 months between June and September, 2005.

Sampling technique

Bodija market was selected for the study as it has a fair representation of the different socio-demographic groups of stationary female traders in Ibadan. It is predominantly a food market and has about 3000 stalls which are divided into five blocks, each block representing a cluster and the stalls were numbered in a serial order. Respondents were identified for the study using multistage sampling technique. Three of the five blocks were selected by simple random sampling and by systematic sampling a mother was recruited in every 5th stall. Where there was no eligible mother, the next stall was visited. If there was more than one eligible mother in the stall, one was selected by simple random sampling.

Study instrument

Data were collected by means of a semi-structured, pre-tested questionnaire, which was administered to the mothers by trained interviewers. The information obtained were socio-demographic characteristics of the mothers and children's including age, sex, level of education, birth order, place of delivery, work characteristics and immunization data. The immunization status of the children obtained from the mothers was crosschecked with their immunization cards. Validation was done by translating to Yoruba, the local language and back translating to English. Pre-testing of the questionnaire was carried out among mothers attending the infant welfare clinic of the Institute of Child Health, University College Hospital, Ibadan.

Inclusion criteria

The study involved women of childbearing age that had children between the ages of 12 and 23 months. Where a mother had more than one eligible child, the younger one was recruited into the study as it gave a better reflection of the current practice of the mother. The vaccines included in this study were: BCG, OPV and DPT (three doses) and measles.

Permission/ethical approval

Permission was sought from the Chairman of the Market Women's Association of Bodija and ethical approval obtained from the Ethical Committee of the Oyo state Ministry of Health. Informed consent was obtained from mothers who participated in the study after explaining the purpose of the study and what it entailed. Those who did not want to participate had a right to decline being interviewed. Confidentiality and anonymity were maintained during the conduct of the study by using serial numbers only and not names. Children were referred for immunization if they had not completed their immunization.

Data management

The data obtained were entered into a computer and analyzed with SPSS version 11.0 and were presented in frequencies, tables and appropriate graphs. Chi-square test was used to test associations involving discrete data. The level of significance was set at $P \leq 0.05$. Logistic regression was used to estimate the predictors of incomplete immunization for the socio-demographic variables.

Results

A total of 418 female traders in Bodija market, Ibadan were interviewed during the survey period.

Socio-demographic and work characteristics

The means age of all mothers was 27.8 ± 4.9 years (range 16 - 42). Table 1 shows that most mothers 402 (96.2%) were married, 325 (77.8%) in monogamous marriages and 190 (45.6%) had secondary level education. Most of the women, 386 (92.4%) sold their wares in the market at least six days a week and 297(71.1%) spent more than eight hours a day in the market. Majority of the mothers 328(78.5%) always took their children with them to the market.

The mean age (\pm SD) of the children was 17.5 ± 3.5 months. There were 250 (59.8%) males, 141(33.7%) of the children had more than 2 siblings while 54 (12.9%) were the only children of their mothers. As shown in table 2, 82 (19.6%) of the children were born outside health facilities, either in the church or at home.

Table 1: Bivariate associations between sociodemographic variables and immunization status

Variable	Completely immunized No (%)	Partially/non immunized No (%)	Total (%)	Chi square	P value
<i>Sex</i>					
Male	105(42.0)	145(58.0)	250(100)	0.46	0.499
Female	65(38.7)	103(61.3)	168(100)		
<i>Mother's age(years)</i>					
15-19	1(4.3)	22(95.7)	23	36.00	.001
20-24	18(24.0)	57(76.0)	25		
25-29	90(50.8)	87(49.2)	177		
30-34	52(49.1)	54(50.9)	106		
≥ 35	9(24.3)	28(75.7)	37		
<i>Marital status</i>					
Never married	5(38.5)	8(61.5)	13	.027	.869
Ever married	165(40.7)	240(59.3)	405		
<i>Mother's education</i>					
Up to primary	56(25.9)	160(74.1)	216	40.27	0.001
Secondary and above	114(56.4)	88(43.6)	202		
<i>Mother's religion</i>					
Christianity	100(49.8)	101(50.2)	201	13.43	0.001
Islam	69(32.1)	146(67.9)	215		
<i>Ethnicity</i>					
Yoruba	144(40.1)	215(59.9)	359	0.33	0.566
Others	26(44.1)	33(55.9)	59		
<i>Family setting</i>					
Monogamous	155(47.7)	148(48.8)	325	29.85	0.000
Polygamous	15(16.1)	78(83.9)	93		

Immunization coverage, BCG Scar, immunization sites

Among all the children, 383 (91.6%) were either fully immunized or had received some immunization. A total of 170(40.7%) children had received full immunization while 35(8.4%) had never received any form of routine immunization. An immunization

Figure1 shows that highest coverage was seen with BCG vaccine 382(91.4%), while measles had the lowest coverage for routine vaccines 176(42.1%). The newer vaccines Yellow fever and Hepatitis B vaccines had very low coverage levels of 41(9.8%) and 4(1%) respectively. DPT1 to DPT3 drop out rate was 32.1%.

Table 2: Bivariate associations between other variables and immunization status

Variable	Completely immunized No (%)	Partially/non immunized No (%)	Total (%)	Chi square	P value
Place of delivery					
Government hospital	58(34.3)	111(65.7)	169	29.18	0.0001
Private hospital	51(42.1)	70(57.9)	121		
Missionary	34(73.9)	12(26.1)	46		
Church	20(40.8)	29(59.2)	49		
Home	7(21.2)	26(78.8)	33		
Days in the market					
≤5 days	4(12.5)	28(87.5)	32	11.396	0.001
≥ days	166(43.0)	120(57.0)	386		
Hours spent in the market					
Up to 8	36(38.3)	59(61.7)	94	0.229	0.632
>8	122(41.1)	175(58.9)	297		
No of children by same mother					
None	11(20.4)	43(79.6)	54	13.07	0.004
1	38(42.2)	52(57.8)	90		
2	65(48.9)	68(51.1)	133		
>2	56(39.7)	85(60.3)	141		

record was seen to confirm the status in only 69(18.5%) of them. Information on immunization was obtained by recall in the large majority 308 (82.0%) while five (1.3%) children had cards was but there were no entries in them.

Among the children who were fully or partially immunized, a BCG scar was seen in 286(83.6%) of the children. It was absent in 87(25.4%) and 9(2.6%) of the children were not available for verification of a scar. Among the fully immunized children, a BCG scar

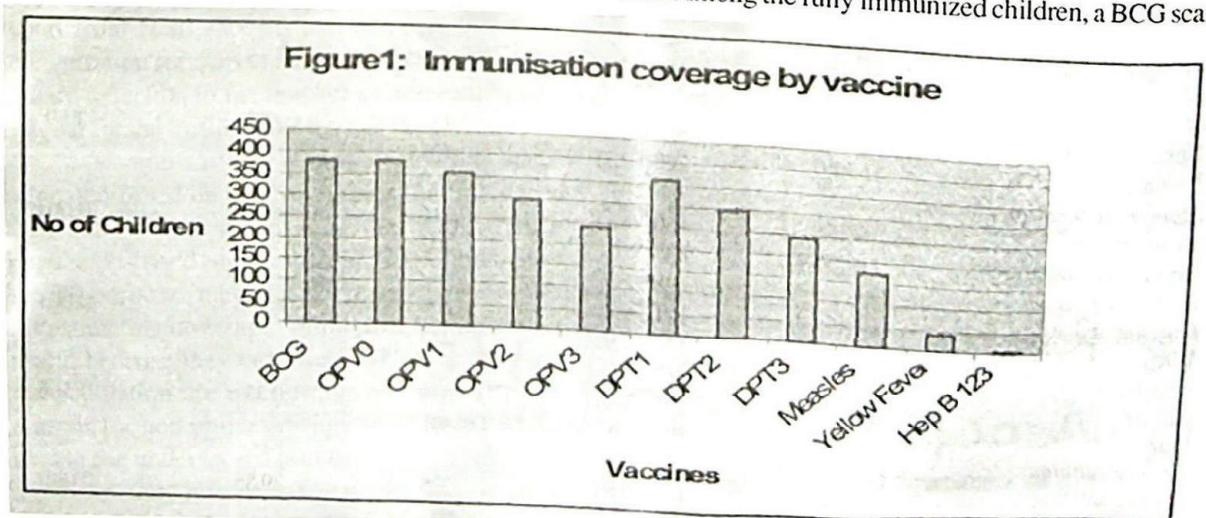


Fig. 1: Immunization coverage by vaccine

was seen in 144 (84.7%) of them. It was not seen in 22 (12.9%) and could not be verified in 4 (2.4%) of them. Among the children who had received immunization, all the children received their immunization at static sites in health facilities. The percentage of children whose immunization was given in a government health facility was highest (76.1%) while only 1(0.003%) was given in a church. No immunization was received at outreach or mobile sites.

Immunization coverage by 12 months of age (validity)

Among the children immunized who had information on age at immunization, 128 (39.9%) were fully

secondary education or more were likely to have completed their immunization, OR 2.7 (95% CI, 1.12 – 2.72), so also were children of mothers who spent six or more days a week in the market OR = 4.5 (95% CI, 1.43 – 1.37) than those of other women. Maternal age, place of delivery and number of children by same mother were not significant predictors.

Discussion

The study was carried out to assess the immunization status of children of female traders in a large urban market, in South Western Nigeria, who were within the age-range of 12-23 months. Full immunization by

Table 3: Logistic regression of complete immunization status and socio- demographic factors

Variable	Â	Odds ratio (OR)	95% CI OR	P value
<i>Family type</i>				
Monogamous	1.308	3.700	1.94 – 7.08	0.001
Polygamous		1.00		
<i>Mother's age</i>				
≥30 years	0.085	1.089	0.63 – 1.89	0.760
<30 years		1.00		
<i>Mother's education</i>				
≥Secondary	1.008	2.740	1.72 – 4.35	0.001
Primary		1.00		
<i>Mother's religion</i>				
Christianity	0.555	1.743	1.12 – 2.72	0.014
Islam		1.00		
<i>Days of the week in market</i>				
Everyday	1.497	4.470	1.43 – 13.97	0.010
≤5 days		1.00		
<i>No of other siblings</i>				
≥3	0.449	1.565	0.92 – 2.70	0.100
<3		1.00		
<i>Place of delivery</i>				
Others	0.583	1.791	0.72 – 4.46	0.210
Home		1.00		

immunized before the age of 12 months compared to 193(60.1%) who were not completely immunized. The number of children who were fully immunized before 12 months of age (valid coverage rate) was 30.6%.

Associations between socio-demographic variables and immunization status

Table 3 shows the predictors for complete immunization among the children, those from monogamous homes were more likely, OR 3.7 (95% CI, 1.94 – 7.08, p=0.001) to have completed their immunizations. Similarly, children of mothers with

card or history was recorded in only 40.7% of the children studied while 8.4% children had never been immunized. Full immunization coverage at the South Western zonal level within the study period was 38.3% also estimated by card and history and was comparable with the 40.7% obtained from the present study [5]. The Nigerian National Demographic Survey (NHDS) of 2003 showed that only 13% of Nigerian children aged 12- 23months were fully immunized using the information from both the vaccination records and mothers' recall [9].

The low immunization levels could indicate that there is a problem with immunization delivery or

access among the target population. Furthermore, the results of the present study show that the DPT 1 to DPT3 vaccine drop out rate was high (32.1%) which is more than the 10% acceptable drop out rate [10]. This indicates that relatively larger numbers of these children start immunization services as they have good access to the services but many fail to continue till completion indicating poor utilization and delivery of the immunization services. A similarly high drop out rate ranging from 12.9% for the South East Zone to 41.1% for the North East Zone of Nigeria was also recorded in the NPI survey report for the period [5]. Improvement of the immunization coverage at the national level and among the study population should therefore focus on ways to increase continued delivery and utilization of the services. For instance focus people could be identified among the market organization who would be involved in the dissemination of key immunization and other health related information during the routine market meetings.

With regards to individual vaccines, the highest coverage was seen with BCG (91.4%) while measles had the lowest coverage with 42.1%. This is not surprising since mothers would avail themselves of health care services in the first weeks after delivery and new mothers in most ethnic groups in Nigeria are not allowed to go to sell in the market place until the mandatory six weeks post delivery. The low measles coverage rate collaborated by the high DPT1 to DPT3 drop out rate of 32.1% could then be explained by the fact that they take along their infants to the market and may not take them to health facilities for immunization.

Yellow fever and Hepatitis B antigens, which are also included in the National Programme on Immunization schedule, had very low coverage levels of 9.8% and 1% respectively. The vaccines are the newest inclusions in the NPI schedule. This finding could mean that the level of awareness about these vaccines is not sufficient among both caregivers and even health caregivers. Nigeria is one of the high endemic countries for Hepatitis B and infant immunization is one of the major ways of reducing the incidence [11].

Immunization surveys aim at identifying subgroups of the population that are not getting immunized. Since the current study has shown that immunization coverage among the children of market traders is low and all the immunizations were received at static sites, special activities including outreach can be planned to optimize the immunization coverage among the children. A study from Haiti had shown that taking the immunization to the market place was

effective in reducing the incidence of tetanus [8]. However, it is generally much more expensive in terms of effort and resources to use outreach or mobile immunization services to reach children who have missed the routine immunization compared to fixed services in which health workers spend less time to reach each child and there are no transportation and per diem costs involved [12]. Considering that children who are not immunized are vulnerable to outbreaks of vaccine-preventable diseases, the benefits far out weigh the cost.

Compliance with routine childhood immunization has been shown to vary with socioeconomic factors [13]. The level of maternal education was significantly associated with the immunization status of the children. Mothers with at least secondary education were more likely to completely immunize their children. This finding is similar to that reported in a cohort study carried out on infants in Dhaka, Bangladesh, where mothers' failure to comply with completing immunization in the infants was associated with lack of education and low income [14]. From Papua New Guinea, maternal education was found to be positively associated with knowledge of immunization, and was also significantly associated with actual immunization practice [15]. It is important therefore to find ways to improve female education.

Using logistic regression, a surprising finding from this study was that mothers who went to the market >five days in a week were more likely to fully immunize their children. It would have been expected that such women would have been too busy to take their children for immunization. Earlier studies found that traders may be too busy to take their children for immunization a finding that was not corroborated in this study as women who spent more days in the market had children with higher immunization rates [6,7]. The explanation for this finding in the present study is not clear since majority of the mothers worked for long hours and had their children with them in the market. The women and their children in the previous studies included those from transient populations whereas the women and their children in our study were settled in the town.

The limitation to this study is that there may be bias in recollecting whether a child has had an immunization and when the immunization was obtained. In addition, the mothers' honesty, memory and understanding of their child's vaccinations had to be relied on. Confusion may have also arisen from other medical treatments given. Therefore, where available, the information obtained on immunization

status of the children were cross checked with their immunization records including cards or other documentations obtained at the immunization sites. However, many of these had been lost and some had been unreliably filled in.

In conclusion, the immunization coverage rate among children of female traders in Ibadan was low but was comparable to the coverage at the state level within the study period. It is therefore recommended that routine immunization should be strengthened, vaccines made readily available in nearby health facilities and outreach services provided in order to bring immunization to the door steps of these mothers.

References

1. UNICEF. Immunization summary. A Statistical Reference. 2005
2. Federal office of statistics and UNICEF, Lagos. The progress of Nigerian children. 2007 African Book Builders Ltd, Ibadan
3. WHO. Weekly epidemiological record 2006; 81(19): 189–196
4. WHO. Expanded Programme on Immunization EPI. 1987.
5. National Programme on immunization. Federal Republic of Nigeria. Immunization coverage survey report.2003.
6. Kobayashi M, Hirakawa K, Sawada M, Suzuki C, Saikawa S, Ando H, Nakane M and Nakano T. Vaccination coverage of Poliomyelitis among less than 5-year-old children in the markets of Niger. *Jpn J Infect Dis* 2003; 56: 175-176.
7. Nakano T, Ding ZR, Liang ZS, Matsuba T and Xu W. Transient population by passed by polio vaccination programme in Yunnan Province, China. *Lancet*1997; 350 (9083): 1004.
8. Berggren WL. Administration and evaluation of rural health services. I. A tetanus control program in Haiti. *Am J Trop Med Hyg* 1974; 23(5) : 936 – 949.
9. National Population Commission (2004). Nigeria Demographic and Health Survey, 2003. Calverton, Maryland: National Population Commission and ORC/Marco 2004.
10. USAID. Immunization Essentials. 2003 A Practical Field Guide.
11. Vryheid RE, Kane MA, Schatz and Bezabeh S. Vaccination against hepatitis B in low endemic countries. *Vaccine* 2000; 19(9-10): 1026 -1037.
12. NPI. Nigeria Routine Immunization and Vaccine Preventable Diseases Bulletin 2005; 1 (3).
13. Waldhoer T, Haidinger G, Vutuc C, Haschke F and Plank R. The impact of sociodemographic variables on immunization coverage of children. *Eur J Epidemiol.*1997; 13(2):145-149.
14. Zeitlyn S, Rahman AK, Nielsen BH, Gomes M, Kofoed PE and Mahalanabis D. Compliance with diphtheria, tetanus, and pertussis immunisation in Bangladesh: factors identifying high risk groups. *BMJ* 1992; 304(6827):606-609.
15. Freeman PA, Thompsoason JA and Bukenya GB. Factors affecting the use of immunization among urban settlement dwellers in Papua New Guinea. *P N G Med J*; 1992; 35 (3): 179-185

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