Abstract

INTRODUCTION

Despite improvements in global and national immunization coverage rates with the advent of intensified efforts from the WHO, UNICEF and global partners, inequalities still persist in immunization uptake in many parts of the developing world to the detriment of children within the lowest socio-economic groups. While many factors have been associated with sub-optimal immunization coverage, the independent effects of these factors on complete immunization remains poorly understood.

OBJECTIVE

This study aims to add to the body of existing knowledge by examining present levels of immunization coverage in Nigeria and identify significant factors responsible for the variations in immunization coverage amongst children aged 12-23 months in Nigeria, with the goal of making a case for gaps needed to be addressed in the global eradication of poliomyelitis.

METHODS

A cross-sectional study utilizing data from the Nigeria Demographic health Survey of 2008. Information about immunization status was collected for children aged 12-23 months who were expected to have received all the WHO recommended antigens, from their vaccination health cards and/or mother’s verbal recall. Immunization was regarded as complete if all 8 scheduled antigens had been received by the child; partial if some but not all had been received, and none if the child has never received a vaccine since birth.

Binary and Multinomial logistic regression models were used to estimate the odds ratios and 95% CI for complete and partial immunization respectively, as well as antigen specific completion rates, by the select factors while adjusting for one another. Stratified analysis was also performed by source of information on vaccination status (vaccination card versus mother’s recall) to rule out effect modification. Level of statistical significance was set at p<0.05.
RESULTS

The study had 4601 participants with a mean age of 16.62 (SD: 6.83) months. Immunization status was determined from vaccination cards for 26% of study population while mother’s verbal reports accounted for 73%. Male and female were equally distributed. 22.6%, 48.6%, and 28.7% of the children were fully, partially, and not immunized respectively. Almost half of the sample (49.2%) had received BCG, slightly over a third had completed their DPT and OPV schedule (35.5% and 39%, respectively), while 40% had received measles vaccinations.

Factors significantly associated with complete immunization uptake included tetanus vaccination during pregnancy, (multivariate adjusted OR: 3.55, 95% CI 2.71-4.67), high socio-economic status, manifested by either maternal education (secondary or higher education compared to none; multivariate adjusted OR 1.54, 95% CI 1.13-2.09), or increasing family wealth (rich compared to poor; multivariate adjusted OR 1.81, 95% CI 1.30-2.54). Delivery of the child at a health facility was positively associated with complete immunization with multivariate adjusted OR of 1.58 (95% CI, 1.28-1.95). In addition, mothers older than 29 years tended to vaccinate more (AOR 2.97, 95% CI, 1.57-5.62), and being from a tribe other than Hausa Fulani was positively associated with complete immunization (multivariate adjusted OR 1.86, 95% CI, 1.23-2.80). The perception that distance of home to the nearest health facility was far was associated with decreased uptake of immunizations (multivariate adjusted OR 0.70, 95% CI 0.57-0.86), as was being of Islamic faith (multivariate adjusted OR 0.63, 95% CI 0.49-0.82), living in the rural area (multivariate adjusted OR 0.77, 95% CI 0.63-0.95), from the North east (multivariate adjusted OR 0.46, 95% CI 0.31-0.68) region of Nigeria, and being in a polygamous union (OR 0.77, 95% CI 0.61-0.97) which were all inversely associated with complete immunization.

When stratified by source of information, there was effect modification by source of information of vaccination status with birth order of the index child 2-4 (birth order 2-4 compared to only child, multivariate adjusted OR 0.87, 95% CI 0.60-1.26; multivariate adjusted OR 1.87, 95% CI 1.21-2.90 by vaccination card and mother’s verbal recall respectively), size of the child at birth (small relative to normal or big. multivariate adjusted OR 0.89, 95% CI 0.58-1.36; multivariate adjusted OR 1.68, 95% CI 1.12-2.51 by vaccination card and mother’s verbal recall respectively), and age of the mother at first birth (>=18 years compared to <18 years; multivariate adjusted OR 0.75, 95% CI 0.52-1.09; multivariate adjusted OR 1.09, 95% CI 0.77-1.55 by vaccination card and mother’s verbal recall respectively).

Most of the factors were not significantly associated with completion of third dose of polio (OPV 3) uptake, with the exception of mother receiving tetanus in pregnancy (multivariate adjusted OR 1.34, 95% CI 1.21-1.61), delivery of index child at the health facility (multivariate adjusted OR 2.02, 95% CI 1.69-2.41), Islamic religion
(multivariate adjusted OR 0.69, 95% CI 0.55-0.87), and perceiving distance from nearest health facility as being far from home (multivariate adjusted OR 0.69, 95% CI 0.55-0.87). Other factors associated with specific antigen completion rates were older age of the mother for BCG, DPT, and measles (>=30 years compared to teenagers: BCG multivariate adjusted OR 1.80, 95% CI 1.08-3.01, DPT3 multivariate adjusted OR 2.37, 95% CI 1.36-4.14; Measles multivariate adjusted OR 3.71, 95% CI 2.29-6.02), Hausa Fulani tribe for DPT and measles (other tribes compared to Hausa Fulani; DPT3 OR 1.75, 95% CI 1.23-2.47; Measles OR 1.58, 95% CI 1.18-2.10), rural area of residence for BCG (BCG multivariate adjusted OR 0.78, 95% CI, 0.62-0.98) and birth order greater than 5 (5+ compared to only child multivariate adjusted OR 0.69, 95% CI, 0.51-0.95).

CONCLUSIONS

The consistent significant positive association of receiving tetanus in pregnancy and delivery of child at health facility as the strongest factors associated with complete, partial, and specific antigen immunization stresses the importance of intensified advocacy for maternal health services utilization, especially institutional delivery since 65% of the births in this study were delivered at home or other places outside the health facility. This would indirectly increase immunization uptake rates. Also important is the role of socio-economic status such as post secondary maternal education and rich (wealthy) families as positive predictors of complete immunization.

It is also worthy to mention the significant inverse association between Islamic faith and north eastern Nigeria and complete immunization. While on stratification by source of information of vaccination status, the association is significant only from mother’s verbal reports, which may be a biased finding, anecdotes from the Nigeria state make the findings plausible. The North-eastern region is home to the dreaded Boko Haram Islamic sect which has been terrorizing Nigerians since 2004, recently killing 9 polio vaccination workers during the polio rounds in Feb 2013. The region and its neighboring region, the North west (which also showed significant but lower odds of sub-optimal immunization in this study) are red alert zones of insecurity in Nigeria and as such the atmosphere becomes non-conducive for health care seeking behavior including immunizations, coupled with the perceptions in these areas that vaccines are western inventions aimed at reducing the population of northern Nigeria.

It is important to emphasize the lack of association between most of the socio-economic and demographic factors with completion of OPV, which may be plausible following access to the vaccine through the national immunization days of the global polio eradication initiative. However, the vertical nature of these campaigns may be responsible for the significant positive associations between socio-economic status factors and other
demographics and completion of other antigens (BCG, DPT3, and Measles) to the detriment of the low socio-economic quintile, and younger mothers.

**RECOMMENDATIONS**

Up scaling and improving sensitization activities aimed at promoting access and utilization of free maternal health care services should be promoted which could serve as an indirect campaign for immunization uptake.

Insecurity has to be tackled headlong by the necessary authorities, where efforts at polio eradication is hampered by the Boko Haram sect in the North Eastern part of Nigeria

Advocacy to Islamic groups through their respected and educated spiritual leaders (Mallams) is also needed in order to recruit them as champions of immunization to educate their members of the benefits of immunization, but more importantly to advocate for the rights of the Hausa Fulani woman to education and empowerment.

The Global polio eradication initiative could broaden its role in providing access to immunization with other antigens (other than OPV) in reducing inequalities as shown with non-significant association of socio-economic and other demographic factors with completion of polio immunization from this study. This may have to involve making other antigens such as BCG, DPT, and measles part of its door to door vaccination campaigns if issues related to cold chain and manpower logistics needed for such huge efforts can be tackled