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Understanding vaccine hesitancy in polio eradication in northern Nigeria

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ABSTRACT

Background: Vaccine hesitancy constitutes a major threat to the Global Polio Eradication Initiative (GPEI), and to further expansion of routine immunisation. Understanding hesitancy, leading in some cases to refusal, is vital to the success of GPEI. Re-emergence of circulating wild poliovirus in northern Nigeria in mid-2016, after 24 months polio-free, gives urgency to this. But it is equally important to protect and sustain the global gains available through routine immunisation in a time of rising scepticism and potential rejection of specific vaccines or immunisation more generally.

Methods and findings: This study is based on a purposive sampling survey of 1653 households in high- and low-performing rural, semiurban and urban areas of three high-risk states of northern Nigeria in 2013–14 (Sokoto, Kano and Bauchi). The survey sought to understand factors at household and community level associated with propensity to refuse polio vaccine.

Wealth, female education and knowledge of vaccines were associated with lower propensity to refuse oral polio vaccine (OPV) among rural households. But higher risk of refusal among wealthier, more literate urban household rendered these findings ambiguous. Ethnic and religious identity did not appear to be associated with risk of OPV refusal.

Risk of vaccine refusal was highly clustered among households within a small sub-group of sampled settlements. Contrary to expectations, households in these settlements reported higher levels of expectation of government as service provider, but at the same time lesser confidence in the efficacy of their relations with government.

Conclusions: Results suggest that strategies to address the micro-political dimension of vaccination – expanding community-level engagement, strengthening the role of local government in public health, and enhancing public participation of women – should be effective in reducing non-compliance, as an important set of strategies complementary to conventional didactic/educational approaches and working through religious and traditional 'influencers'.

1. Introduction

Over the last three decades, the Polio Eradication Initiative (PEI) has generated uniquely rich insights into the processes of mass vaccination. In particular – in a global context of unprecedented media and social media visibility and contested and fragmenting views of governance and legitimacy – the attempt at universal immunisation with Oral Polio Vaccine (OPV) in the last endemic countries has illuminated a complex behavioural terrain of vaccine hesitancy, incorporating episodes of mass open resistance and more subtle layering of dissatisfactions, anxieties and frustrations resulting in non-compliance among eligible households and communities.

The need to locate, understand and address immunisation non-compliance is critical in the case of eradication, insofar as even small residual clusters of under-vaccinated children constitute a continuing risk to the interruption of transmission providing sanctuaries in which virus can sustain circulation [1–4]. Although the re-emergence of wild poliovirus in Nigeria in August 2016 was

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most directly associated with conflict-related inaccessibility in Borno State, the fact that cases were sequenced to virus undetected locally since 2011 suggests sustained indigenous circulation, possible 'blind spots' in the polio programme, and gives urgency to the need to ensure maximum coverage and minimal incidence of missed children, as well as the continuing underlying need to strengthen routine immunisation services across high-risk areas [5–7].

Understanding residual and refractory behaviour in the demand side for mass public health initiatives – especially where such behaviour is clustered, and associated with other forms of socioeconomic deprivation or socio-political marginalisation – constitutes a valuable legacy of polio eradication for reinvestment in future public health programmes [8]. It can help reinvigorate routine immunisation – a critical requirement for sub-Saharan Africa in particular; it can support better understanding of broader structural factors adversely affecting access to and uptake of routine antigens [9]; and it can inform strategies towards universal healthcare provision under SDG3.

Much research on vaccine demand places heavy emphasis on individual behaviour, privileging proximal cognitive factors generally articulated as 'knowledge, attitude and practice' [10,11]. But the emphasis on behaviour as essentially individual, or within households analysed as discrete units (intra-household), may unduly constrain our ability to understand vaccine behaviour as collective, shaped through inter-household influence at community or local area level [12–14]. This is particularly problematic where evidence from polio eradication increasingly points to socio-spatial clustering of non-compliant behaviour [15–17].

2. Methods

This study is based on a household survey conducted between 2013 and 2014 in three states of northern Nigeria in the period prior to removal of the country from the polio endemic list in July 2015. The survey was contextualised by significant improvement in campaign vaccine coverage, but persistent 'time-invariant latent causes and spatial clustering of risk [of children being missed]' [18]. The study was designed to focus on areas with higher incidence of 'missed children'. Insofar as OPV non-compliance (or 'refusal') is increasingly exceptional as programme coverage rises, research focusing on whole-population sampling methods, even in a region of low vaccine coverage, may struggle to generate discrete information with regard to groups located at one extreme of the behavioural spectrum.

We selected three of 11 high-risk northern Nigerian states (Sokoto, Kano, Bauchi). Within each state, we selected a pair of geographically-adjacent 'high-' and 'low-performing' (HP/LP) Local Government Authorities (LGA), and within each LGA, a pair of HP/LP Wards – where 'high-' and 'low-performing' were defined using the national programme's risk classification system. Within each Ward, two pairs of high- and low-performing settlements, defined respectively as <5% and >10% missed children during the most recent three Supplementary Immunisation Activities (SIA) were selected, including rural, semiurban and urban settlements [19,20]. Within each settlement, 30 households were randomly selected using a sampling frame based on the size of the settlement. We estimated a sample of 480 households per state. The survey comprised a total of 3306 individual (male and female) interviews in 1653 households.

In each household, survey enumerators carried out separate interviews with the male and female heads of households (or 'senior wife' in cases of polygynous household). The incorporation of two interviews per household (male and female) was designed to allow for investigation of consistency or difference between paired household respondents' answers – to enable us subsequently to explore possible hypothesised effect of household male/female agreement/disagreement on propensity to refuse OPV. In the end, intra-household reporting was largely consistent, with certain dimensions (e.g. household assets, community participation) in which males reported higher values than females. We opted to rely on female respondents for the household dependent variable value (propensity to refuse OPV in future) and potential correlate independent variables, on the ground that female household heads tend to be more directly instrumental in having or not having children vaccinated. For composite indices, male and female values were combined. Eligibility of households for survey was based on presence of at least one child (<5 years age) eligible for vaccination with OPV. Enumerators were recruited from the three target states, and deployed in paired male-and-female teams to maximise access to respondents.

The survey interview was structured to cover four question areas: household socioeconomic status; family health conditions and experiences of care seeking; caregivers' perceptions of household and community development and of external actors relating to processes of development; & caregivers' knowledge of and attitudes towards routine immunisation and polio vaccination. The sequential structure of the survey, leaving the issue of polio until the final section, was deliberate. After 20 years of house-to-house OPV campaigns and associated programme surveys, parents and caregivers are sufficiently familiar with polio-specific questions to be able to game their answers in line with understood norms.

The selection of variables was driven by our core hypothesis – that household attitudes to polio vaccination and hence compliance were likely to be shaped by material conditions and households' perception of the role, legitimacy and effectiveness of the government and other actors responsible for those conditions. We hypothesised that households with worse socioeconomic conditions and lesser trust in government would be more likely to refuse polio vaccination, or consider withholding compliance. We focused on 'propensity to refuse' OPV (intention to refuse OPV in future campaigns, 'yes/not sure', female respondent) as our dependent variable.

Analysis of data was carried out at both household and at settlement (community) levels. A settlement-level dataset was generated by combining all household information by settlement to create average values for each of the variables. Settlement average values were used to categorize sample communities into terciles based on the proportion of women reporting 'propensity to refuse OPV' (the highest tercile labelled 'very high-risk' (VHR), the bottom tercile, 'very low-risk' (VLR)).

Variables relating to particular household dimensions (e.g. 'asset wealth', 'health experience', 'vaccine knowledge', 'intensity of religious observation', 'trust in government', 'community participation') were grouped to define a number of discrete, mutually exclusive indices. Grouping was done according to thematic areas rather than through correlation testing. Illustration of these indices is included in annex A; the 'vaccine knowledge index', for example, incorporated simple yes/no values for respondents asked if they were aware of individual routine antigens, as well as positive response to a question regarding the value of immunisation in general, and appropriate knowledge of valid modes of vaccination. Statistical significance of the relationship between any two grouped variables was measured by simple chi-square test. Bivariate and multivariate logistic regression models were used to explore household-level variables. Difference between VHR and VLR settlements was assessed using simple bivariate regression models.

Ethical approval was sought from and granted by the Nigerian National Research Ethics Committee (NNREC), Johns Hopkins University (JHU), and the University of East Anglia (UEA). Verbal consent protocols were developed, translated into Hausa.