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RESEARCH ARTICLE

ORAL POLIO VACCINE REFUSAL PATTERN IN KUMBOTSO LOCAL GOVERNMENT AREA, KANO STATE, NORTHERN NIGERIA.

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Abstract

Poliomyelitis is a disease caused by a virus, affecting the nervous system and resulting in paralysis in survivors. It is transmitted through the faeco-oral route and may result in the death of those affected if the respiratory muscles are involved. Refusal of Oral Polio Vaccine (OPV) administration to children, by their parents and caregivers, is a difficulty faced by the Polio Eradication Initiative (PEI) in multiple endemic areas. The reasons advanced were mostly on too many OPV campaigns, the possibility of being a mode of birth control and many other different manifestations of OPV refusal. A cross-sectional survey was used, in the course of four rounds of the polio campaign activities. Qualitative data concerning community perceptions were collected through focussed group discussions and interviews with mothers/caregivers, key community informants and local health managers. While quantitative data collection was done using a questionnaire survey of mothers and community influencers. A total of 400 interviews were conducted, females were higher in number 207 (51.8%) than the males 193 (48.3%). The age of the interviewees ranged from 20 to 54 years, and all had some level of education; a majority had primary education 170 (42.5%) while the least had western education up to tertiary level 18 (4.5%). Caregivers refuse OPV administration to their wards mainly because of fear of side effects, religious beliefs, and too many rounds. Communication strategies by the programme implementers should be aimed at increasing awareness of poliomyelitis as a real health threat and educating the people about the usefulness of the vaccine. Partners in polio eradication should collaborate with other health agencies and ministries to improve primary healthcare packages in order to address identified other health and social needs.

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Introduction:-

Poliomyelitis (or simply polio) is a disease caused by a virus, which affects the nervous system, resulting in paralysis in children. It is transmitted through faeco-oral route and may result in the death of those affected if the respiratory muscles are involved (CDC, 2017; WHO, 2018). Numerous challenges facing polio eradication continue to arise and differ from region to region, but one of such challenges is vaccine refusal (Ternullo, 2017). History of vaccine refusal dates back to the time of Edward Jenner (1749–1823), whose work with the protective efforts of cowpox virus in conferring immunity to smallpox is credited as the first deliberate, standardized approach to disease eradication using a known vaccine (Saint-Victor and Omer, 2013). Oral Polio Vaccine (OPV) refusal is a difficulty encountered by the Global Polio Eradication Initiative (GPEI) in multiple endemic areas, not only in Nigeria but other countries as well, such as Afghanistan and Pakistan (Singh *et al.*, 1997; Feldman-Savelsberg *et al.*, 2000; Khan and Sahibzada, 2016). The accumulation of susceptible children whose caregivers refuse to accept vaccine had contributed to the spread of poliovirus in Nigeria (Michael *et al.*, 2014).

Religious and cultural misconceptions, compounded by malicious rumours on the polio campaigns, especially in the northern parts of the country have contributed significantly to vaccine refusals in northern Nigeria (Ghinai *et al.*, 2013). The reasons advanced were mostly on too many OPV campaigns, the possibility of being a mode of birth control and many other different manifestations of OPV refusal (Murakami *et al.*, 2014; Khan and Sahibzada, 2016). Refusal of OPV has been experienced in other countries that are still transmitting indigenous Wild Polio Virus (WPV) such as Pakistan and Afghanistan (Grassly, 2013) and also those that have in recent years been certified free of polio such as India (Singh *et al.*, 1997). Wealth, female education and knowledge of vaccines were associated with lower propensity to refuse OPV among rural households, but higher risk of refusal among wealthier, more literate urban household rendered these findings ambiguous. Surprisingly in a study conducted outside the country, ethnic and religious identity did not appear to be associated with risk of OPV refusal (Taylor *et al.*, 2017).

At a point in the year 2003, the polio campaign had to be discontinued by the government of Kano State due to the negative public outcry on unfounded rumours of various deleterious effects of OPV on the children who received OPV (Ghinai *et al.*, 2013). Negative pronouncements further compounded this situation by traditional and religious leaders in Kano State and some notable persons within and outside the health profession.

We investigated the reasons and possible solutions for persistent OPV refusal by parents in Kumbotso LGA of Kano State, Nigeria.

Methods:-

Study setting:

Nigeria is located in the West African sub-region and has a total landmass of 923,768 Sq. Km with an estimated projected population of over 180 Million (NPC, 2018). Kano State is one of the thirty-six States in the country; located in the central, northernmost part. It is reputed to have the largest population in the country that is predominantly Muslim and Hausa-Fulani by tribe. The State has 44 Local Government Areas (LGAs) that are the equivalent of Districts in some settings. Kumbotso is among the 8 Metropolitan LGAs in the State. The study was conducted in Kumbotso LGA which has an estimated total population of about 0.5M inhabitants, located within the main town and surrounding villages. The inhabitants are mostly peasant farmers and cattle-rearers. There are, however, interspersed within the communities, many petty traders, menial workers, and nomadic groups. Primary Health Care (PHC) service in Nigeria is delivered mainly through public health facilities though private providers also contribute significantly. However, the infrastructures delivering these services are mostly dilapidated, compounded by inadequate human resource for health, resulting in poor services.

Study design:

Cross-sectional study was adopted with some adaption from the works of Murakami *et al.*, (2014) and Gituro *et al.*, (2017) amongst the parents/caregivers of OPV refusal families with children aged <5 years. The research was conducted during four rounds of OPV campaign activities conducted in January, April, May and October, 2018. Each OPV round lasted for four days. Participants for the study were randomly sampled from a line-list of non-compliance households in the LGA, a total of 400 households were randomly selected from the list of refusal families in the LGA using Probability Proportionate to Size (PPS) technique. All the sampled households were interviewed in the study. The polio campaign activity was conducted by vaccination teams (usually ad-hoc, non-health workers under the supervision of trained health personnel), recruited for the four-day duration of the exercise

where they visit from house-to-house to administer the OPV to eligible children who are below the age of 5 years. Data concerning the parents'/caregivers' perceptions were collected by filling the questionnaire.

Inclusion criteria:

Presence of heads of households on the list of noncompliance for the four rounds of Immunization Plus Days (IPDs) in 2018 and presence of an eligible child (0-5 years) within the household.

Exclusion criteria:

Refusal of consent, the absence of the head of household or relocation of the household outside the study area.

Sample size determination:

We calculated sample size based on the maximum prevalence of noncompliance of 50%.

The size of the participants for the study was estimated as follows:

$$N = Z^2pq/L^2$$

(Ngowi *et al.*, 2007)

Where:

- N is the sample size
- Z is the standard normal distribution at 95% = 1.96
- p is the probability 0.5
- q is 1-p which is 0.5
- L² is the allowable error (5%) = 0.05

$$\begin{aligned} \text{Therefore, } & (1.96)^2 \times 0.5 \times 0.5 / \\ & (0.05)^2 \\ & = 384.16 \text{ participants} \end{aligned}$$

The sample size of 400 non-compliant head of households (parents/care givers) were interviewed for the study.

Statistical analysis:-

Data generated from the study was collected electronically while analysis was done using Epi Info version 3.5.4 2011. The statistical significance was accepted or rejected at the p-value of 0.05

Ethical approval

Ethical approval was obtained from the National Primary Health Care Development Agency and Kano State Ethical Review Committee. Verbal/written consent for the children to be enrolled were obtained from the parents/caregivers.

Results:-

Demographic characteristics of responders

A total of 400 parents/caregivers of the households who consented, were interviewed. Table 1 depicts the socio-demographic characteristics of the respondents. We interviewed more females (51.8%) than the males (48.3%). The age of the interviewees ranged from 20 years to 54 years, the respondents in the 20 – 24 age group were fewer when compared with other age groups.

Table 1:- Characteristics features of respondents

Characteristic	Frequency (Percentage)
Age groups in years	
20 – 24	32 (8.0)
25 – 29	40 (10.0)
30 – 34	65 (16.3)
35 – 39	71 (17.8)
40 – 44	66 (16.5)

45 – 49	57 (14.3)
50 – 54	69 (17.3)
Total	400 (100.0)
Gender	
Male	193 (48.3)
Female	207 (51.8)
Total	400 (100.00)

Reasons for OPV refusal

Birth control

A total of 291 respondents regarded the OPV administered to children as a means of birth control while 109 said it was not. Refusal of OPV was more among the females (207) than the males (193) as shown in Table 2.

Table 2:- Perception of respondents of OPV as a means of birth control
(p-value = 0.2112)

Gender	Used for birth control (%)	Not for birth control (%)	Total
Male	144 (49.5)	49 (45.0)	193 (48.3)
Female	147 (50.5)	60 (55.0)	207 (51.8)
Total	291 (72.8)	109 (27.3)	400 (100.0)

Educational level

All the respondents had some level of education; a majority had a primary education (42.5%) while the least had formal education up to tertiary level (4.5%) as shown in Table 3. One hundred and seventy respondents had education up to primary level while 72 completed secondary level. The males were more exposed to formal education when compared with females sampled.

Table 3:- Educational level of responders
(p-value = 0.0806)

Gender	Quranic school	Primary school	Secondary school	Tertiary school	Total
Male	57 (40.7)	93 (54.7)	36 (50.0)	7 (38.9)	193 (48.3)
Female	83 (59.3)	77 (45.3)	36 (50.0)	11 (61.1)	207 (51.8)
Total	140 (35.0)	170 (42.5)	72 (18.0)	18 (4.5)	400 (100.0)

Religious bias

Among the respondents, 175 believed receiving OPV is against religious injunctions. While 225 believed it did not contravene any religious injunction, this is shown in Table 4. The females were more in opposition to the vaccine on a religious basis.

Table 4:- Religious perception of OPV uptake in the study area
(p-value = 0.0002)

Gender	Not against religion	Against religion	Total
Male	102 (45.3)	91 (52.0)	193 (48.3)
Female	73 (32.4)	134 (76.6)	207 (51.8)
Total	225 (56.3)	175 (43.8)	400 (100.0)

Fear of side-effects

295 respondents expressed the fear of side-effects compared with those that felt did not pose any problem (105) this is shown in Table 5. The female parents/caregivers expressed greater concern about the vaccine's ability to cause side effects.

Table 5:- Distribution of responders based on side effects
(p-value = 0.2362)

0	No side effects	Has side effects	Total
Male	47 (44.8)	146 (49.5)	193 (48.3)
Female	58 (55.2)	149 (50.5)	207 (51.8)
Total	105 (26.3)	295 (73.8)	400 (100.0)

Fear of too many rounds

Two hundred and ninety-four respondents said they are refusing OPV to be administered to their children/wards because they have received several doses earlier, while 106 respondents did not show any concern, as shown in Table 6. The females slightly showed greater concern with 152 rejecting as compared with 142 males.

Table 6:-Perception of respondents as per the number of rounds implemented
(p-value = 0.4872)

Gender	Indifferent	Too many rounds	Total
Male	51 (48.1)	142 (48.3)	193 (48.3)
Female	55 (51.9)	152 (51.7)	207 (51.8)
Total	106 (26.5)	294 (73.5)	400 (100.0)

Discussion:-

The study involved interviewing 400 parents/caregivers in the study area. Out of this number 193 (48.3%) were males while 207 (51.8%) were females. The age of those interviewed ranged from 20 to 54 years. The participants had different levels of education: Quranic 140 (35.0%), Primary 140 (42.5%), Secondary 72 (18.0%) and Tertiary 18 (4.5%). Differences between the male and the female refusal of OPV have been observed by quite a number of other findings (Mello *et al.*, 2010; Murakami *et al.*, 2014). Majority of heads of the households had more than one reason for not allowing their children to be vaccinated with OPV. About 35.0% of the 400 interviewed lacked formal education. Lack of formal education has been associated with vaccine refusal in many developing countries (Saint-Victor, and Omer, 2013). In this study, only 18 (4.5%) had education up to tertiary level. In studies conducted in India and Nigeria, lack of formal education have been linked with the lack of knowledge about immunization and negative attitude towards OPV (Singh *et al.*, 1997; Obadare, 2005; Mohammed *et al.*, 2014).

On the other hand, in developed countries, advanced educational status has been a significant factor in vaccine refusals (Omer *et al.*, 2009). The same goes for heads of households in Kumbotso, which for some inexplicable reasons vehemently refused to allow OPV to be administered to their children/wards for no apparent reasons. This is worrisome for the polio eradication program in Nigeria, a country with an adult literacy rate of about 57% and much lower (25 - 50%) for northern Nigeria (UNESCO, 2012). The findings in this study are in agreement with a similar study in Turkey, where mothers with higher educational background chose to fully immunize their children compared to those with lower education (Torun and Bakirci, 2006).

Two hundred and ninety-four respondents (73.5%) out of the total number interviewed refused their children/wards to accept OPV because they have received from previous rounds. Of this number, 142 (48.3%) were males, while 152 (51.7%) were females. This was similar to findings in other studies conducted, where the most common reason given by parents for refusing vaccination was "too many doses" (Balraj and John, 1986; Cobos *et al.*, 2015).

Of the 400 who were enrolled in the study, 295 (73.8%) of them refused OPV vaccination for their children/wards for fear of side effects. About 146 (49.5%) were males, while 149 (50.5%) were females. We found that noncompliant heads of households believed that OPV was not safe, as observed in the neighbouring country of Cameroon from a similar study (Feldman-Savelsberg *et al.*, 2000).

Fears related to impotence and infertility due to vaccination was found to be very high among the study population in India (Singh *et al.*, 2010). The notion by the communities that though OPV or other "better" formulations of the vaccine are given to children in other cultures in developed countries, the children of Kumbotso LGA were being administered with an adulterated formulation that could even be harmful.

About 175 (43.8%) of the participants refused OPV vaccination for their children/wards because of religious injunctions. About 91 (52.0%) of those who refused were males, while 134 (76.6%) were females.

Parents/Caregivers refused OPV mostly because of poor polio risk perception and religious beliefs (Michael *et al.*, 2014). Religious beliefs were an important driver in the way people understood the disease.

From what was observed in this study, the government in collaboration with development partners and experts should support the conduct of operational studies to fully understand factors that may be responsible for non-compliance in addition to what was outlined here, earlier observed by Umeh *et al.*, (2018). Addressing these issues could, therefore, be key to eliminating polio and other diseases of public health importance (Svea *et al.*, 2015). Although our study was conducted in Kumbotso, these findings may be generalizable and extrapolated to other parts of northern Nigeria as Khowaja *et al.*, (2012) suggested to authorities in Pakistan. The program has to do more in order to make the people particularly the mothers realise the dangers of not vaccinating their children. Communication strategies should also be aimed at increasing awareness of polio as a real health threat and educate communities about the safety of the vaccine.

Conclusion:-

Caregivers may refuse OPV mostly because of poor polio risk perception, religious beliefs, and distrust of government programs and intentions. The challenge of vaccine refusals by a significant number of parents and caregivers has historically been a significant concern for Nigeria and the rest of the world. This refusal alone is sufficient to undermine the success of the global polio eradication effort. Failure will mean all the resources and sacrifices made would have been in vain. Unfounded rumours have led to the misconception of the programme with very adverse religious connotation; mistrust of immunization and the erroneous belief of population control and other disease-causing contents in the OPV generally used for the eradication campaign.

Furthermore, it is necessary to improve education, so people understand the basic concept of revaccination and booster doses, thereby assisting in creating a basic understanding of vaccinations. Communication strategies should, therefore, be aimed at increasing awareness of poliomyelitis as a real health threat and educating the populace about the safety of the vaccine. Polio eradication partners should collaborate with other agencies and ministries to improve total primary healthcare packages to address identified unmet health and social needs.

Competing interests

We declare no competing interest in this study.

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