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Full Length Research Paper

An assessment of the impact of health education on maternal knowledge and practice of childhood immunization in Kware, Sokoto State

Oche, M. O.[1]*, Umar, A. S.[1], Ibrahim, M. T. O.[1] and Sabitu, K.[2]

[1]Department of Community Health, College of Health Sciences, Usmanu Danfodiyo University, Sokoto, Sokoto State, Nigeria.

[2]Department of Community Medicine, Faculty of Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

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Immunization is one of the most powerful and cost effective weapons of modern medicine, and is a major tool being used to achieve the 4th Millennium Development Goals (MDG). This study was therefore aimed at assessing the impact of health education using the Community Level Nutrition Information System for Action (COLNISA) strategy on knowledge and practice of childhood immunization among mothers in Kware town, Sokoto State. This was a controlled community trial in two semi urban communities in Sokoto State, Nigeria. The study population comprised of mothers of children 0 to 23 months old chosen based on eligibility criteria. A total of 179 mother-child pairs were recruited into the study. Data collected at baseline and after intervention were analyzed using EPI INFO 3.3 software. The level of knowledge was assessed using a scoring system as adequate and inadequate which is used to assess immunization coverage for diptheria, pertussis and tetanus (DPT3). At baseline, 59 and 53% of the mothers had adequate knowledge of childhood immunization in the intervention and control communities, respectively. However, following intervention, 69 and 51% of the mothers in the intervention and control communities, respectively had adequate knowledge. Similarly, at the post intervention phase of the study, DPT3 rose from 21 to 33% in the intervention community while a decrease in coverage from 26 to 20% was observed in the control community. Generally the low immunization coverage in the study area could be attributed to the low level of knowledge among the mothers about immunization services and the poor attitude of health workers. The finding of this study, strongly indicate that improved knowledge and community participation has the potential to create positive attitudinal and behavioural change if culturally appropriate community educators and influencers are used.

Key words: Nigeria, childhood immunization, maternal knowledge, health education intervention, community volunteers.

INTRODUCTION

Immunization is one of the most successful and cost-effective health interventions ever. It has eradicated small-pox, lowered the global incidence of polio so far by 99% and achieved dramatic reductions in illness, disability and death from diphtheria, tetanus, whooping cough and measles. In 2003 alone, it is estimated that immunization averted more than 2 million deaths of which approximately 1.5 million deaths occur among children under the age of two (WHO/UNICEF, 2005; United Nations, 2010). This high childhood mortality particularly in developing countries necessitated the declaration of the millennium development goals (MDG) by world leaders aimed at reducing child mortality by two thirds by the year 2015 as compared to figures obtained in 1990 (MDG 4).

Although, Universal Child Immunizations (UCI) has been in existence for the past 3 decades, Nigeria has one of the lowest immunization coverage rates in the world

*Corresponding author. E-mail: eyalofun@yahoo.com.

(Simon, 1999). For instance, the Nigerian Demographic and Health survey (NDHS, 2009) reported that only 23% of children aged 12 to 23 months were fully immunized while 29% had never received any immunization at all. Furthermore, Sokoto State (the study area) had only 2 and 64.7% as children fully immunized and never received any routine immunization at all, respectively. The World Health Organization (WHO) uses diptheria, pertussis and tetanus (DPT3) coverage to monitor immunization system performance across the districts of a country or territory and this is because, it indicates that a child has access to immunization services and that the services were utilized, that is, they returned on at least 3 occasions. It is calculated as the cumulative number of children who had received DPT3 against the target population multiply by 100 (FMoH/NPHCDA, 2009).

However in recent years, the failure to achieve the overall objectives of reduction in childhood morbidity and mortality has led to a more purposeful approach that will bring about the desired impact at the community level with the full involvement of the communities. It is in realization of this that UNICEF and her partners in the field of nutrition developed a more practical and purposeful approach at nutrition information management geared towards improving nutrition as part of an Early Childhood Development (ECD) strategy with childhood immunization as one of the strategies (Achoba, 1999). This information system is called Community Level Nutrition Information System for Action (COLNISA), which uses the triple 'A' concept (assessment, analysis and action) also pioneered by UNICEF (Engle et al., 1997; Johnson et al., 1998). COLNISA, for all intents and purposes, is a participatory decision making process that addresses the problems of immunization in the community, taking into cognizance its nature, misconceptions, drop outs, rejection of vaccines and availability of resources to tackle the problems.

It is in view of the poor immunization status of Sokoto State as reported (NDHS, 2009) that forms the basis for this study with a view to increasing the awareness and utilization of immunization services amongst mothers and other care givers in Kware town.

METHODOLOGY

Study area and design

This was a controlled community trial using Kware town as the intervention community while Bodinga town was chosen as the control community, about 50 km apart. They are both headquarters of Local Government Areas (LGAs) with the vast majority of the population largely farmers and illiterates. The main indigenous tribe in both communities is Hausa/Fulani with Islam as the main religion. Both towns are connected to the national grid of the Power Holding Company of Nigeria (PHCN) and both have pipe borne water supply. The intervention (Kware) and control (Bodinga) towns have a total population of 24, 112 and 32,424, respectively (National Populaion Commission, 2010). These towns are served by both a primary health centre and a comprehensive health centre run by the Usmanu Danfodiyo University Teaching Hospital, Sokoto and both health centres provide comprehensive primary health care services and immunization services which are free.

Study population

The study population comprised of mothers of children less than two years of age (0 to 23 months). This is because the health facility routine immunization registers made provision for children vaccines as either 0 to 11 months and for children aged 12 to 23 months as a second opportunity for children more than 1 year old.

The minimum sample size was determined using the formula for comparing two proportions in selected samples of both intervention and control groups (Kirkwood, 1988).

$$n = \frac{\{ u\sqrt{[\pi_1 (1- \pi_1) + \pi_2 (1- \pi_2)]} + v \sqrt{[2 \pi (1- \pi)]}\}^2}{(\pi_2 - \pi_1)^2}$$

Where $\pi = \pi_{1} + \pi_{2/2,}$

U = One sided percentage point of normal distribution corresponding to 100% (power). Here power = 90%, u = 1.28.

v = Percentage point of the normal distribution corresponding to the two sided significance level = 50%, v = 1.96.

π_1 = Proportion of value (DPT3 coverage) to be determined = 30% in a previous reports (Akande, 1996; NDHS, 2009).

π_2 = Proportion of value to be determined post-intervention = 15%, n= 161.

To compensate for non-response and attrition with anticipated 90% response rate, n = 179.

Sampling procedure

Advocacy visits were paid on community and opinion leaders during which the COLNISA strategy was explained, after which the community nominated 10 literate persons from women associations, religious groups and traditional institutions to act as COLNISA volunteers who were supported by the researchers and health workers from the study area. The COLNISA volunteers were oriented for a total of 4hrs over 2days on the data collection instruments, the benefits of immunization and inter personal communication (IPC) skills to sensitize and mobilize mothers and caregivers for immunization services in their respective assigned areas in the community. The materials for the orientation were developed from the basic immunization and the reaching every ward approach field guides (FMoH/NPHCDA, 2009). A day was set aside for house numbering by the volunteers. The intervention community (Kware town) was divided into 4 sectors. One of the sectors was selected using table of random numbers. At the centre of this sector, the direction to commence the sampling was chosen using spin a bottle technique and the first household along that direction was selected and on completing each selected household, on exit, the sampling continued in the right direction. In a compound with more than one household having a child less than 2 years, a random selection is done. In this study, a household is defined as people eating from the same pot. Based on the estimated total number of households of 895, and a minimum desired sample size of 179, a sampling fraction of 1/5 was used and a 1 in 5 sample of 179 matched mother-child pairs were selected. In a house where there were no under 2 year old children, the next house was chosen. Where there were more than one mother-child pairs in a house, one was selected using simple random sampling and where there was more than one under 2 year old children from same mother, the youngest was recruited into the study. At the end of the road, the research assistants kept turning to the right until the

desired numbers of 179 matched mother-child pairs were obtained. These procedures were also repeated in the control community (Bodinga town) for the same sample size. The study was approved by the ethical community of Usmanu Danfodiyo University Teaching Hospital Sokoto while verbal consent was obtained from heads of households and mothers or caregivers of the under two years children.

Data collection during pre-intervention phase

The instrument used was an interviewer administered questionnaire, which was pre-tested in Argungu town in Kebbi State. The questionnaire sought information on socio demographic characteristics of mother-child pair and assessed maternal knowledge and utilization of childhood immunization services. Information gathered through the questionnaires was analyzed and the pre-intervention findings were presented at a meeting with the community and other opinion leaders where problems hindering utilization of immunization services by mothers in the community were identified. Solutions were then proffered and an action plan was drawn up which was implemented by the COLNISA volunteers.

A week after the collection of baseline data in the intervention community (Kware), same data was also collected by similar COLNISA volunteers in the control community (Bodinga) supervised by the researchers.

Intervention phase

The intervention was basically sensitization and mobilization of mothers and caregivers on the benefits and schedule of routine immunization through compound meetings for females and community dialogue with leaders and heads of households of mother-child pairs that were recruited and the baseline questionnaire was administered to them in the local language by the local community volunteers. The volunteers also visited the houses of participating study units for interpersonal communication.

Data collection during post-intervention phase

After nine months following the intervention, same sets of questionnaires were administered to the mothers in both the intervention and control communities. Thereafter, community leaders and heads of household in Bodinga (control community) were sensitized on the benefits of immunization.

Data analysis

Data collected at baseline and after intervention were analyzed using EPI INFO 3.3 software computer programmes and Microsoft Excel in Windows 7. Univariate statistical tests were used to determine associations and differences. Significance of association was tested using F, χ^2 or 't' test, a probability value of < 0.05 was considered significant .

In this study, DPT3 was used to assess full immunization. This is because the measles coverage in Sokoto State has achieved the national target of 80% in 2009 (higher than the DPT3) partly due to maternal, newborn and child health week immunization campaign conducted in November, 2009 as well as measles vaccinations conducted during measles outbreaks in line with the current WHO position paper on measles outbreak response (SMoH, 2009; FMoH/NPHCDA, 2010; WHO, 2009; WHO/UNICEF, 2006). DPT3 coverage was calculated as the cumulative number of under 2 year old children who had received DPT3 against the total of 179 children sampled in both intervention and control community multiply by 100 (FMoH/NPHCDA, 2009). An author devised scoring and grading system was adopted, every correct answer on the knowledge of immunization attracts one mark and a respondent scoring less than 50% was considered to have inadequate knowledge while scores of 50% and above were graded as having adequate knowledge of immunization (Basu, 1988; Kana et al., 2007; Umar, 2008).

RESULTS

A total of 179 mothers of children 0 to 23 months of age were studied in the intervention and control communities respectively.

The ages of the children ranged from 0 to 22 months, with mean age of 9.8 ± 0.66 and 10.46 ± 0.65 in the intervention and control communities, respectively (t = 9.53; df = 356; P < 0.000) (Table 1).

The ages of the mothers ranged between 14 to 45 years with mean ages of 29.83 ± 10.32 and 29.83 ± 13.26 in the study and control communities, respectively (t = 0.000; df = 36; P > 0.999).

The educational attainment of mothers showed that 117 (66%) of the mothers in the intervention community had no formal western education compared to 102 (57%) in the control group. There was no significant statistical difference in literacy rate among the mothers in the two communities (χ^2 = 3.50; df = 4; P = 0.4777) (Table 1).

The occupational status of the mothers showed that 109 (61%) and 114 (69%) of the mothers were full time house wives in the study and control groups, while 11 (11%) and 14 (13%) of the mothers in intervention and control communities, respectively were civil servants. The occupation of the mothers in the two communities showed no statistical difference (χ^2 = 4.222; df = 2; P = 0.1212) (Table 1).

At baseline, 106 (59%) mothers had adequate knowledge of childhood immunization in the intervention community while in the control community 94 (53%) of the mothers had adequate knowledge of immunizations. Even though the proportion of mothers in the two communities who knew about childhood immunization differed, this was however not statistically significant (χ^2 = 1.371; df = 1; P = 0.2417, RR = 1.147; 95% CI: 0.9271 to 1.419) (Table 2).

Using DPT3 to determine immunization coverage in the two communities, at baseline in the intervention community showed that the proportion of the children immunized were, DPT1 (23%) and DPT3 (21%) while the proportion immunized in the control community were DPT1 (29%) and DPT3 (26%) (Figure 1). The difference in the immunization status of the children between the two communities was not statistically significant (χ^2 = 4.476; df = 2; P = 0.107).

Also at baseline, the DPT3 drop out rates (the number of children who commenced DPT1 and could not get immunized with DPT3) for the intervention and control communities were 7.3 and 9.8%, respectively (Figure 2). Reasons adduced by mothers for not taking their children

Table 1. Socio-demographic characteristics of study units.

Variable		Intervention community number (%)	Control community number (%)	P value
Age of children (months)	0 - 11	115 (64)	105 (59)	T = 9.53;df = 356; P = 0.0001 (Significant)
	12 - 23	64(36)	74 (41)	
	Mean age	9.8 ± 0.66	10.46 ± 0.65	
Sex	Male	105 (59)	104 (58)	F = 0.999; df = 1; P = 1.0000 (Not significant)
	Female	74(41)	75 (42)	
Educational status of mothers	None	60(34)	63 (30)	χ^2 = 5.33; df = 4; P = 0.2551 (Not significant)
	Arabic	67(31)	49 (17)	
	Primary	33(18)	38 (11)	
	Secondary	10(11)	16 (15)	
	Tertiary	9(5)	13 (7)	
Occupation of mothers	Full time house wife	109 (61)	114 (69)	χ^2 = 1.023; df = 2; P = 0.5995 (Not significant)
	Civil servant	21(11)	24 (13)	
	Trading	49(17)	41 (17)	

Table 2. Maternal knowledge of childhood immunization in intervention and control communities by phase of the study.

Phase of the study	Level of maternal knowledge	Intervention community number (%)	Control community number (%)	P value
Pre-intervention	Adequate	106	94	χ^2 = 1.371; df = 1; P = 0.2417 (not significant); RR = 1.147; 95% CI = 0.9271 - 1.419
	Inadequate	73	85	
Post-intervention	Adequate	114	91	χ^2 = 5.524; df = 1; P = 0.0188 (significant); RR = 1.309; 95% CI = 1.049 - 1.633
	Inadequate	65	88	

for immunization or not completing the schedules include not being aware of the services (53%), cultural and religious beliefs (20%), the male factor (12%) and attitude of health workers (15%).

After intervention, the drop out rate was 4.4% in the intervention community and 16.3% in the control community (Figure 2). Similarly, after intervention, the proportion of unimmunized children in the intervention community decreased from 141 to 120 children, while it increased from 132 to 143 children in the control community (Figure 3).

After intervention, 114 (69%) of the mothers in the intervention community had adequate knowledge about childhood immunizations while 91 (51%) of the mothers in the control community were adjudged to have adequate knowledge. The difference in the proportion of mothers who had adequate knowledge about childhood immunization in the intervention and control communities was statistically significant (χ^2 = 5.524; df = 1; P = 0.0188, RR = 1.309, 95% CI: 1.049 to 1.633) (Table 2).

Factors found to be significantly associated with level of maternal knowledge of childhood immunization in intervention and control communities post-intervention were age of the child (χ^2 = 9.1; df = 3; P = 0.044), educational status of mother (χ^2 = 33.382; df = 12; P = 0.0008) and occupation of mother (χ^2 = 33.726; df = 6; P = 0.0001) (Table 3).

After intervention, the proportion of children less than two years of age immunized were DPT1 35% and DPT3 33% in the intervention and while in the control community children immunized were DPT1 25% and DPT3 20% (Figure 1). Although, there was 10% point increment in the status of the children who had 3 doses of DPT in the intervention community, the difference was not statistically significant (χ^2 = 0.115; df = 1; P = 0.734).

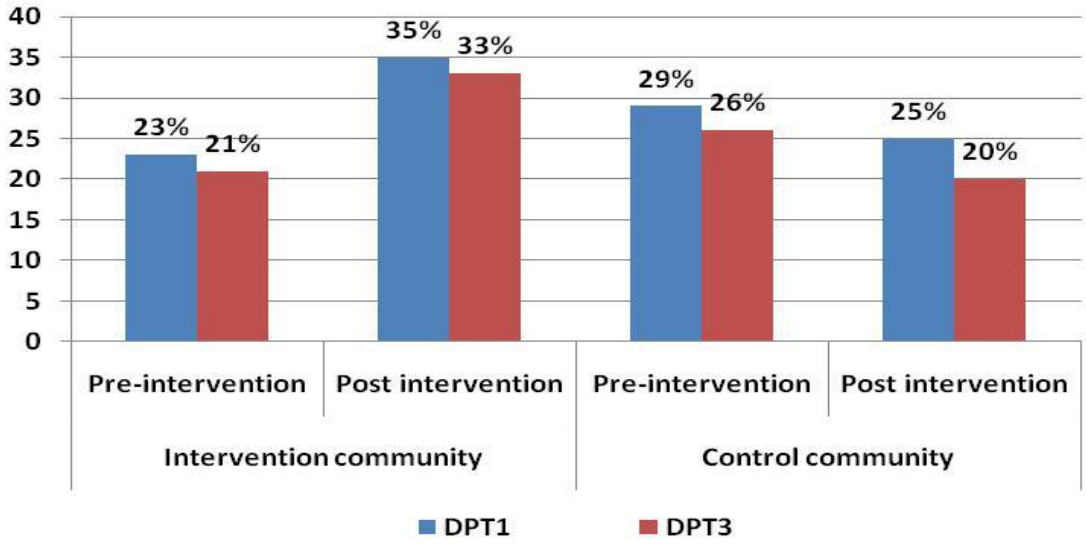

Figure 1. Comparison of DPT1/DPT3 percentage coverage in intervention and control community by phase of the study.

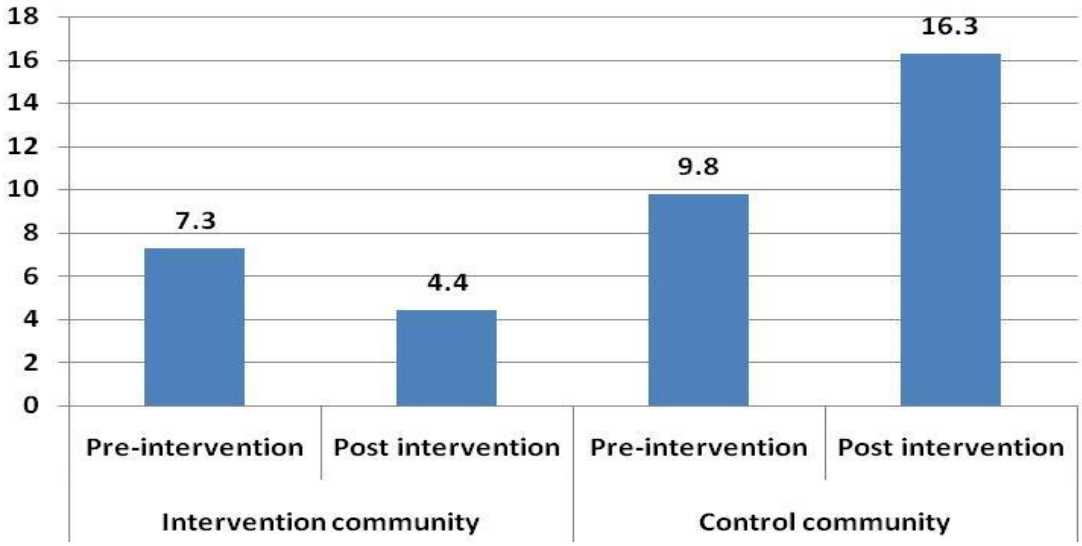

Figure 2. Comparison of drop our rate (%) in the intervention and control group by phase of study.

DISCUSSION

At baseline, half of the mothers in the intervention group had adequate knowledge of the benefits and the schedule childhood immunization. Following intervention, the proportion of mothers with adequate knowledge increased by 10% point. This increase in the level of knowledge of mothers was however found not to be statistically significant (P = 0.14). The proportion of mothers with adequate knowledge obtained in this study was higher than the 44 and 11% reported from studies in India (Basu, 1988) and Canada (Meleth et al., 1995), respectively.

One major difference in the intervention conducted between this study and those from India and Canada was the use of community members as volunteers for the mobilization of mothers which could explain the better improvement in the knowledge of mothers more convincing within the social context of the community. Similar findings were reported by Kurundi et al. (1993) in Ananthapur District of India largely due to the use of community members as educators.

DPT3 coverage improved by 12% point after intervention from 21 to 33%. This proportion approximates the Nigerian national figure of 35% for

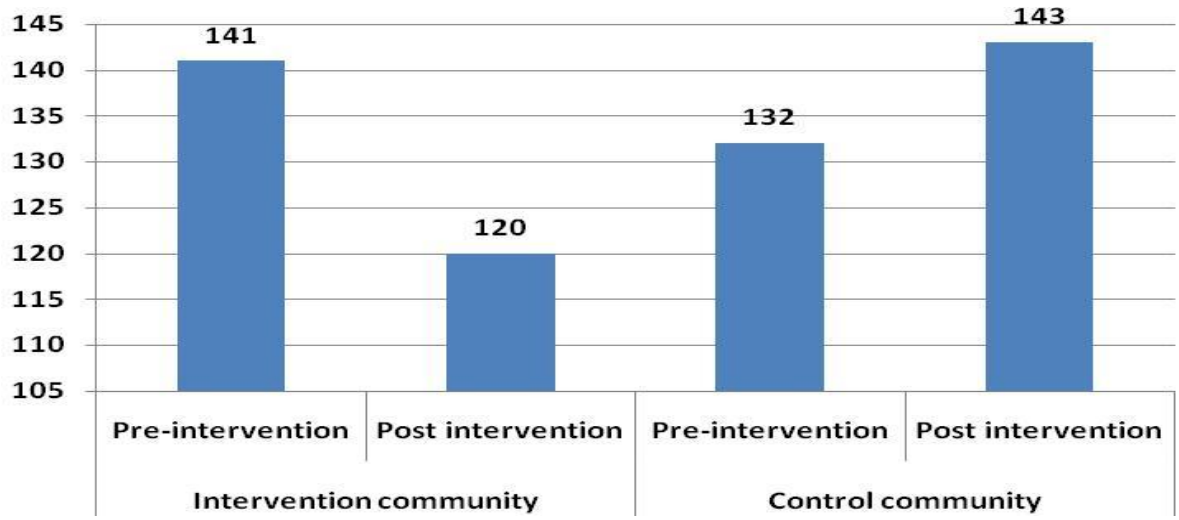

Figure 3. Comparison of the number of unimmunized children in the intervention and control group by phase of study.

Table 3. Factors influencing maternal knowledge of childhood immunization in intervention and control communities post -intervention.

Variable/Characteristic	Level of maternal knowledge				P value
	Intervention community number (%)		Control community number (%)		
	Adequate	Inadequate	Adequate	Inadequate	
Age of children (months)	**n**	**n**	**n**	**n**	$\chi^2 = 9.1$; df = 3; P = 0.044 (significant)
0-11	77	38	61	44	
12-23	37	27	30	44	
Sex					$\chi^2 = 2.321$; df = 3; P = 0.5085 (Not significant)
Male	68	37	48	56	
Female	46	28	43	32	
Educational status of mothers					$\chi^2 = 33.382$; df = 12; P = 0.0008 (significant)
None	35	25	20	38	
Arabic	45	22	29	15	
Primary	21	12	26	12	
Secondary	5	5	10	16	
Tertiary	8	1	6	7	
Occupation of mothers	114	65	91	88	$\chi^2 = 33.726$; df = 6; P = 0.0001 (Significant)
Full time house wife	75	34	75	39	
Civil servant	14	7	6	18	
Trading	25	24	10	31	

2008 (NDHS, 2009) which is far below the national target of 85%, indicating the country has one of the lowest immunization coverage as compared to many countries (Meleth et al., 1995; UNICEF, 2010). However, the 33% recorded following intervention showed remarkable improvement when compared with the 2% recorded in 2008 for Sokoto (NDHS, 2009). Reasons responsible for the observed improvement could be attributable to sensitization of mothers and heads of households who have greater influence on decision making, including health services utilization in this environment. The general low immunization coverage recorded may not be unconnected with the reported 83.5% of females who are illiterates in Sokoto State (NDHS, 2009). Although, the

utilization of maternal and child health services including immunization is most probably an additive effect of many variables, however, several studies have demonstrated a direct relationship between level of maternal education and the number of immunization doses received (Caldwell, 1979; Fosu, 1989; Isiugo-Abanihe, 1995; Odusanya et al., 2008; Oluwadare, 2009; Osazuwa-Peter, 2011a, 2011b). This assertion, coupled with very low immunization coverage (2%) in the state as reported by NDHS (2009) and the findings of this study underscores the need for operational research on the magnitude, pattern and factors influencing immunization service utilization in Sokoto State.

STRENGTH AND LIMITATIONS OF THE STUDY

The strength of the study is the proactive involvement and participation of the community and particularly the use of community volunteers who speak the local language and nominated by the community leaders, which is a major positive difference with the Indian study (Basu, 1988).

The major weakness of the study is the fact that the utilization of immunization services is affected by other factors such as attitude of health workers, illegal cost of services rendered, availability of vaccines and other immunization materials, other competing household/family demands, etc., which were all not part of the study objective and beyond the control of the researchers.

Conclusion

In overall, the modest increase in DPT3 coverage and the reduction in the drop out rate is a welcome development. The findings in this study are a strong indication that improved knowledge and awareness has the potential to cause a positive attitudinal and behavioural change if culturally appropriate community educators and influencers are used. Rigorous behavioural change communication activities for the systematic engagement of parents/ caregivers, religious and other community leaders through sensitization meetings, community dialogue and home visits by community health workers and volunteers will improve programme acceptance and utilization of immunization services.

REFERENCES

Achoba IO (1999). COLNISA concept, module and operational frame work. A UNICEF Seminar . pp. 1-9.

Akande IM, (1996). Knowledge of mothers attending EPI clinics in Ilorin about childhood Immunization. J. Community. Med. Primary. Healthc., 8: 10-19.

Basu RN (1988). India's immunization program. World Health Forum. 6: 35-38.

Caldwell J (1979). Education as a factor in mortality decline: an examination of Nigerian Data. Popul. Stud., 33: 395-413.

Engle P, Lhotska L, Armstrong H (1997). The care Initiative; An Assessment, Analysis and Action to improve care for nutrition. UNICEF, New York.

FMoH/NPHCDA (2009). Revised Reaching Every Ward (REW) field Guide: A Guide for Health Management Teams at Ward/LGA Levels. FMoH/NPHCDA, Abuja, Nigeria.

FMoH/NPHCDA, (2010). National Routine immunization data for, Federal Ministry Of Health/National Primary Health Care Development Agency, Abuja, Nigeria.

Fosu GB (1989). Access to Health care in urban areas of developing societies, J. Health Soc. Behav., 30: 398.

Isiugo-Abanihe UC (1995). Correlates of MCH in Nigeria. Niger. J. Health Plann. Manage., 1(1): 22-30.

Johnson UU, Pelletier D, Shrimpton R (1998). Nutrition Information strategy, Improving decision making at household, Community and national levels. UNICEF New York. pp. 1-7.

Kana MA, Ibrahim MTO, Umar AS, Ameh IG (2007). Effect of training intervention on Malaria case management by PHC Workers in Sokoto North LGA, Sokoto State, Nigeria. Jos J. Med., 2(1): 11 – 15.

Kirkwood B (1988). Essentials of Medical Statistics. Blackwell Scientific Publication Ltd. Oxford, p. 197.

Kurundi P, Neeraj A, Prakasmma M (1993). Utilization of immunization services among under 5 children in a selected Sugali tribal area of Ananthapur District, India. Health Popul. Perspect. Iss., 16: 1-1.

Meleth S, Dahlgren S, Sankaran R, Sankaran K (1995). Vaccination Status of infants discharged from a neonatal Intensive care unit. Canad. Med. Assoc. J., 153(4): 415.

National Population Commission (2010). Projected population of Sokoto State. National Population Commission, Sokoto, Nigeria.

Nigerian Demographic and Health Survey (2009). National Population Commission, Federal Republic of Nigeria, Abuja, Nigeria. ICF Macro, Calverton, Maryland, USA, 317/374.

Odusanya OO, Alufohai EF, Meurice FP, Ahonkhai VI (2008). Determinants of vaccination coverage in rural Nigeria. BMC Pub. Health, 8: 381.

Oluwadare C (2009). The social determinants of routine immunisation in Ekiti State of Nigeria. Stud. Ethno-Med., 3(1): 49-56.

Osazuwa-Peters N (2011a). The Alma-Ata declaration: an appraisal of Nigeria's Primary Health Care three decades later. Health Policy, 99(3): 255-60.

Osazuwa-Peters N (2011b). Determinants of Health Disparities: The Perennial Struggle against Polio in Nigeria. Int.. J. Prev. Med., 2(3): 117 - 121.

Simon CA (1999). Anthropometric, health and demographic indicators in assessing nutritional status and food consumption. FAO: Food and Nutrition Division. pp. 1-6.

SMoH Sokoto (2009). Report of the Maternal, Newborn and Child health Week (MNCHW) Campaign, November. State Ministry of Health, Sokoto, Sokoto State, Nigeria.

Stienhoff MC (1985). Evaluation of the opportunities for and contraindications to immunization in a tropical pediatric clinic. Bull. WHO, 68: 769-776.

Umar AS, Abdulkareem OO (2008) Malaria treatment pattern among Primary Health Care Workers in Sokoto. Niger. Postgrad. Med. J., 15(1): 76–81.

UNICEF (2010). National Immunization Coverage rates, UNICEF State of the World's Children. www.unicef.org/infbycountry/Nigeria-statistics.html (Accessed 15th April).

UNICEF (2010). State of the world's children, National immunization coverage rates:. www.unicef.org/infobycountry/nigeria_statistics.html. Accessed 15th April, 2011.

United Nations (2010). The Millennium Development Goals Report, United Nations, New York. www.un-ngls.org/spip.php?article2686. Accessed 19th May, 2011.

WHO/UNICEF (2005). Global Immunization Vision and Strategy 2006 – 2015. WHO Department of Vaccine and Biologicals and UNICEF Programme Division, Health Section. Geneva, Switzerland. WHO/IVB/05.05.P3

WHO/UNICEF (2006), Joint statement on global plan for reducing measles mortality 2010. Geneva, World Health Organization and United Nations Children's Fund. (http://www.who.int/immunization_delivery/adc/measles/Measles%20Global%20Plan_Eng.pdf).

WHO (2008). Module 5 – Monitoring Immunization system,Training for mid-level managers (MLM), , Immunization, Vaccines and Biologicals, World Health Organization, Immunization, Vaccines and Biologicals department, WHO, Geneve, Switzerland, WHO/IVB/08.05, pp. 24 – 33.

WHO (2009). Response to measles outbreak in mortality reduction setting. Immunization, Vaccines and Biologicals department, WHO, Geneve, Switzerland, WHO/IVB/09.03:4