Journal of Advances in Medicine and Medical Research

25(1): 1-14, 2018; Article no.JAMMR.38287
ISSN: 2456-8899
(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

Health Facility-Based Versus Community-Based Family Planning Education and Utilization of Modern Contraceptives in Rivers State, Nigeria

B. O. Osaro[1*], B. Ordinioha[2] and M. M. Mezie-Okoye[2]

[1]Department of Health Services, Rivers State University, Port Harcourt, Nigeria.
[2]College of Health Sciences, University of Port Harcourt, Port Harcourt, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author BOO conceived the study, wrote the study protocol, designed the family planning messages, managed the analyses of the study and wrote the first draft of the manuscript. Author BO designed the survey questionnaire, managed the intervention at baseline and wrote the final draft of the manuscript and author MMMO managed the literature search, the intervention during follow up period and performed the statistical analysis. All the authors read and approved the pretested survey questionnaire and the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2018/38287
Editor(s):
(1) Hala Ibrahim Awadalla, Assistant Professor, Department of Medical Science, Institute of Environmental Studies and Research, Ain Shams University, Egypt.
(2) Chan-Min Liu, School of Life Science, Xuzhou Normal University, Xuzhou City, China.
Reviewers:
(1) Afaf Abdelaziz Basal, Tanta University, Egypt.
(2) Bobby Joseph, St. John's Medical College, India.
Complete Peer review History: http://www.sciencedomain.org/review-history/22673

Original Research Article

Received 21st November 2017
Accepted 31st December 2017
Published 10th January 2018

ABSTRACT

The use of modern contraceptives by rural women of childbearing age in Nigeria is low. The aim of this study is to compare a community-based family planning education and text message reminder with the conventional health-facility based approach to promotion of modern contraceptive use among rural women of childbearing age in Rivers State, Nigeria.

Place and Duration of Study: This is a quasi-experimental before and after comparative study conducted in Etche (intervention group) and Tai (control group) local Government Areas (LGAs) in Rivers State Nigeria between August 2013 and January 2014.

Methodology: A total of 196 and 184 rural women of child-bearing age, recruited into the intervention and control groups respectively through multi-stage sampling, were followed up for six

**Corresponding author: E-mail: boosaro@hotmail.com;*

months. Data was collected on socio-demographics, parity condition, awareness and sources of information on modern contraceptives, method used, problems encountered in the use of methods as well as reason for non-use and discontinuation of use. Data analyses was done with SPSS version 15. Level of statistical significance was set at $P < 0.05$.

Results: Respondents in both groups were similar in socio-economic characteristics except for age. All (n = 196, 100%) in the intervention group and nearly all (n =182, 98.9%) in the control, were aware of modern contraceptives. Respondents who consistently used a method increased from 37 (18.9%) to 75 (38.3%; $P < 0.001$) in the intervention group but decreased from 49 (26.6%) to 41 (22.2%; $P = 0.33$) in the control. Respondents in the intervention group were more likely to be late users (RR 1.67, 95% CI 0.98 – 2.83); less likely to discontinue use (RR 0.58; 95% CI 0.32 – 1.07).

Conclusion: Community-based family planning education and text message reminders is a more effective approach for promoting modern contraceptive use among rural women.

Keywords: Family planning education; modern contraceptives; rural women; Rivers State Nigeria.

1. INTRODUCTION

There is an increasing trend in world population which is currently estimated to be 7.3 billion people [1]. The developing and resource poor countries of the world contribute to about 75% of this estimated population due to high fertility rate [2]. With a population of 170 million and total fertility rate of 5.5%, [3] Nigeria like other developing countries is faced with the challenges of social pressure and conflict, food insecurity, high disease burden and overburdened healthcare services which retards economic development [4]. An increase in access to effective modern contraceptive can reduce these social, economic and environmental stresses by controlling population growth [5]. In Nigeria, the National Population Policy of 1989 has as its objective 'the reduction of the birth rate through voluntary fertility regulation methods compatible with national economic and social goals' [6]. Consequently individuals and couples as a policy are to have unrestricted access to effective methods of contraception.

The use of modern contraceptives among reproductive aged women in most developing countries has been reportedly low compared to women in developed countries [7,8]. Across countries in sub-Saharan African, urban - rural differences in contraceptive use also occur [5]. In Nigeria the 2008 NDHS reported that only 7% of rural and 17% of urban women of child bearing age 15 - 49 years were currently using a method of modern contraceptive [9]. Other studies among rural women of child bearing age in different parts of Nigeria have also reported modern contraceptive prevalence of between 3% and 29% [2,10-12]. Although the level of modern contraceptive use is low among women in the developing countries, its awareness is appreciably very high [13]. Knowledge of modern contraceptives among women in rural areas of Nigeria have also been reported to be high. The 2013 NDHS reported that 84% of women of reproductive age group can identify at least one method of modern contraceptives [3]. Other studies among rural women in different parts of Nigeria have reported knowledge of modern contraceptives between 65% and 83% [13-15]. In Nigeria concerted efforts to increase access to modern contraceptives have been embarked upon by the Federal Government and NGOs. This efforts has been by an increase in government investment in family planning programmes and the distribution of modern contraceptives to public health facilities in the States. Despite these commitments, the marked disparity in knowledge and use of modern contraceptive still exist and worse still in rural areas. Researchers have attributed this scenario to poor contraceptive attitude and negative religio-cultural practices and perceptions of reproductive age women, which acts as barriers [16-18]. For instance cultural practices like women being honored for having ten or more children, wrong cultural beliefs that the number of children a woman will have is determined by God or that there are repercussions for tampering with ones fecundity and fear of harm from use of modern contraceptives, etc are attitudes which encourage high fertility [16–20].

The emergence of mobile phone technology has improved communication generally and also healthcare delivery. Several studies using text message, a mobile phone technology, have demonstrated improvement in adherence to drug therapy and disease management, health services delivery, timely dispatch of laboratory

results and communication of health information on clients, etc. [21–24]. Researchers on behavioural change intervention have also leveraged on this innovation of mobile phone technology in resource poor settings because it is cost effective, widely used and the delivery of health messages to a client is guaranteed even when the signals fluctuate or the subscriber's phone is switched off [22,25]. Text messages delivered to clients periodically have been shown to act as cues, reminders or social support which reinforce desired healthy behaviours [21- 23].

In Nigeria the coverage of mobile telecommunication networks has widened since its inception in 2001. Rural women in over 5,000 communities and villages subscribe to these networks in order to enhance their social connections and commercial activities. For instance information concerning availability and pricing of commodities are easily communicated via mobile phones [26].

Generally public health programs promoting use of modern contraceptive rely on the conventional approach of delivering family planning information in health facilities and through mass media (radio, television and newsprints). Women in rural communities also depend on these sources for information on modern contraceptive [27]. This approach however has increased the awareness of modern contraceptives without addressing attitudinal issues which are individualized and oftentimes influence the decision to adopt or choose a contraceptive method.

In order to increase access to modern contraceptives, a community based approach has also been adopted especially in rural areas where mobility and family planning services are poor. Based on evidence from Africa, community based distribution programs effectively increased modern contraceptive use [28]. This study therefore seeks to determine the effectiveness of a community-based family planning education followed up with text message reminders, on modern contraceptive behavior of rural women of child bearing age in Rivers State Nigeria. It also seeks to compare this approach with the conventional health facility based approach to family planning education in the underserved rural areas.

1.1 Theoretical Basis for the Study

Human behavior is determined by a complex decision making process that is influenced by social norms, one's beliefs, attitudes and perceptions (perceived susceptibility, perceived severity) concerning the expected behaviour [29]. Therefore we hypothesized that a community-based family planning education followed up with text message reminder will improve the use of modern contraceptive among rural women of child bearing age by addressing the attitudinal issues which act as barriers. The conceptual framework for this research is hinged on the 'health belief theory' (that individuals adopt a new behavior if they perceive that their susceptibility and vulnerability to the preventable condition is high and also belief in the effectiveness or benefits of the desired behavior relative to its cost) [29]. The 'Precaution Adoption Process Model' (PAPM) theory of behavioral change however was used to categorize respondents for purposes of developing tailored family planning messages. This categorization is based on the assumption that the process of behavior change occur in discrete steps and individuals progress from one cognitively distinct stage to another until the desired action/behavior is adopted [30].

2. MATERIALS AND METHODS

2.1 Study Area

This study was carried out in Rivers State, an oil mineral producing State in the Niger Delta area of Nigeria. The State is delineated into three senatorial districts comprising three urban and twenty rural Local Government Areas (LGAs). It has a total population of about 5.2 million people, 2.5 million are females with 69% of them aged 15 – 49 years and are either married or in union [31,32]. The literacy rate among these women is 47.7% [33]. Family planning services is available at private clinics and government owned primary healthcare centers while mobile telecommunication services are provided by MTN, Etisalat, Glo and Airtel telecommunication network providers.

2.2 Study Population

Women of child bearing age (15 – 49 years) in rural areas of Rivers State formed the study population. However only women of child-bearing age who were apparently healthy and are either married or co-habiting were included in the study while those who reported that they are pregnant, newly wedded, intend to be pregnant within the six months of the study or currently receiving treatment for infertility were excluded.

2.3 Study Design and Sampling

This research was a quasi-experimental before and after comparative study with a control arm. The minimum sample size was determined with the formula below [34].

$$n = \left[\frac{2(Z_\alpha + Z_{1-\beta})^2 \times P(1-P)}{(P_0 - P_1)^2}\right]$$

where **n** is the required minimum sample size, $\boldsymbol{Z_\alpha}$ is the z-score corresponding to 5% level of significance for a one tail test, $Z_{1-\beta}$ is the z-score corresponding to power of 90%, P_o is the modern contraceptive prevalence rate among rural women in Nigeria according to the 2008 NDHS[9] (7% ie 0.07), P_1 is the modern contraceptive prevalence rate among rural women in Rivers State after intervention with a detectable increase of 10% (17.0% ie 0.17), P is the mean prevalence rate of use of modern contraceptive (0.12). The calculated minimum sample size was 182 respondents per group. However to adjust for lost to follow up, the sample size was increased by 10% using the formula $k = \left[\frac{1}{1-f}\right]$ where k is attrition, f is the attrition rate (10% ie 0.1). Consequently the minimum sample size was increased to 202 women of child bearing age per group.

2.4 Recruitment of Participants

A multi-stage simple random sampling technique was used in the selection of participants for this study as shown in the flow chart (Fig. 1). Two out of the three existing senatorial districts in the State were first selected, then one LGA was selected per senatorial district (Etche and Tai LGAs). The political wards which are basic unit of Primary Health Care (PHC) services was used to demarcate each of the LGAs into sampling clusters.[35] Ten political wards were selected in each LGA. In each of these clusters, 21 houses were selected and a woman of childbearing age in each selected house was approached to participate in the study. However in the event of refusal to participate or not meeting the eligibility criteria, another woman of child-bearing age in the next house was approached. In situations where more than one nuclear family occupy a house, the wife of the youngest couple was approached to participate. Consequently 210 women of childbearing age were recruited in each LGA.

2.5 Study Material and Data Collection

Data was collected between August 2013 and January 2014 using an interviewer administered structured survey questionnaire designed by the researchers. This was pretested and adjusted to ensure its internal validity. Female Community health extension workers residing within the selected wards were recruited and trained as research assistant to administer the questionnaires.

The interviews were conducted in simple English language or Pidgin English widely spoken in the State. Respondents supplied their names, address and at least one mobile phone number, information on their socio-demographic characteristics, awareness of modern contraceptives, sources of family planning information and services, utilization or discontinuation of any of the modern contraceptives, motivating factors for use and reasons for non-use or discontinuation of use of modern contraceptives. These information were obtained from all the subjects in both the intervention and control groups at baseline, at three months and finally at six months. A respondent is deemed lost to follow up if she can not be contacted after three attempts within three weeks after the third or sixth months.

2.6 Intervention

This was a group family planning education, administered to participants in the intervention group in the communities at baseline and once monthly short tailored family planning text messages sent as a reminder to respondents for six months by the researchers. The family planning education consisted of a 90 minutes lecture on what family planning is, methods of modern contraceptives and their effectiveness, side effects, benefits of use and consequences for non-use. This lecture was reinforced with a demonstration on modern contraceptives methods and a video documentary on the social and medical consequences of unwanted pregnancy. Finally questions were entertained from participants to clarify information presented in the lecture.

For follow up, participants were classified at baseline into seven groups by the researchers and again at the third month based on participant's stage of change in the process of adopting a modern contraceptive method (desired behaviour). The Precaution Adoption

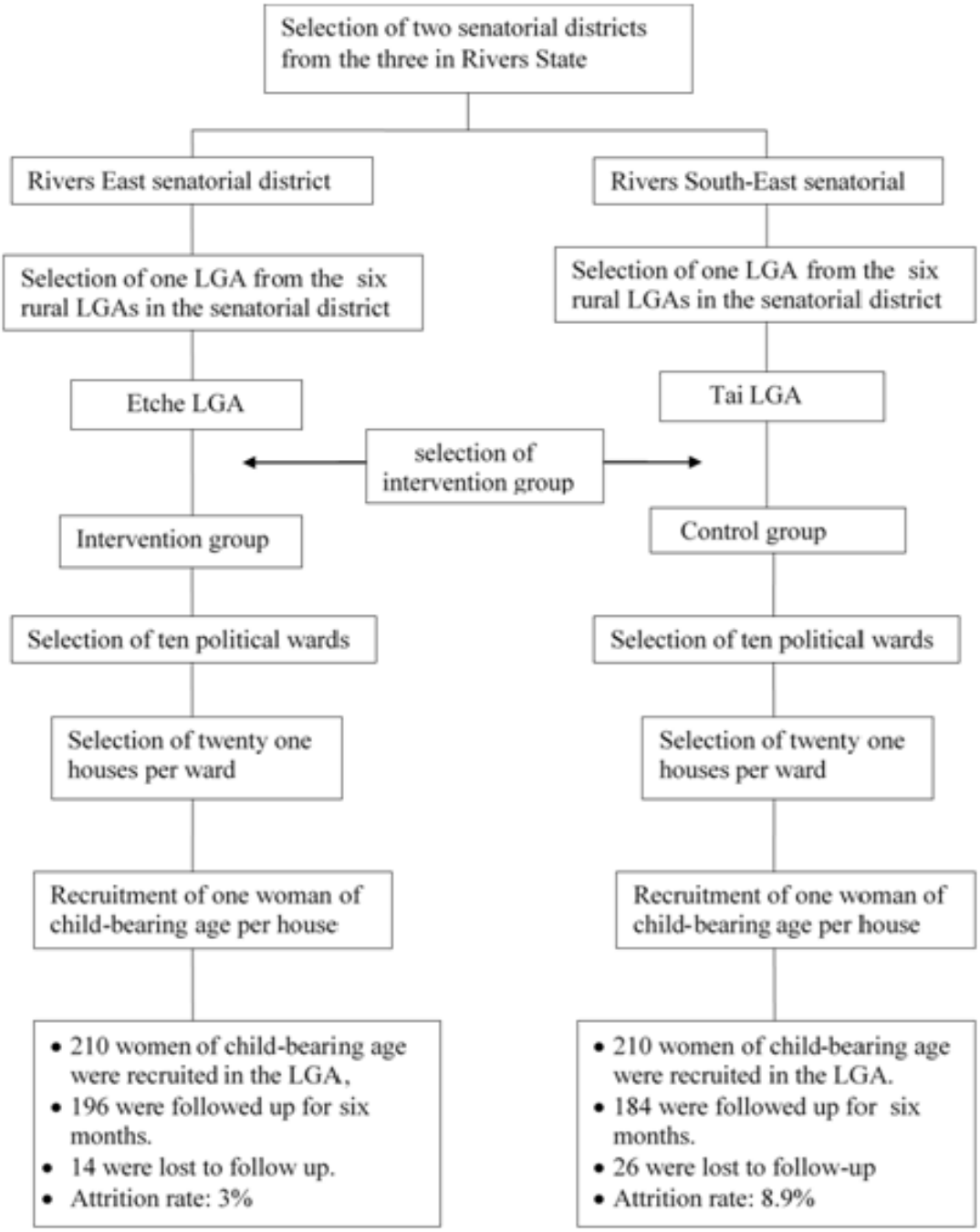

Fig.1 Flow chart of the sampling procedure.

Process Model (PAPM) theory was used for this classification. The problems encountered in the use of any method and the reasons for discontinuation of use or not using any method as reported by respondents in the surveys done at baseline and third month were analyzed as negative attitudes to the use of modern contraceptive method. Based on the conceptual behavioral change theory of 'Health belief', short messages tailored to address the identified negative attitude of each participant to the use of modern contraceptive was developed by the

researchers. The content of these messages were informative and the tones persuassive, designed to motivate participants. For instance respondents who have awareness of modern contraceptives but are still thinking whether or not to use a method (PAPM Stage 3), and have side effect and lack of money as barriers were sent the message: *'You can get pregnant if you do not protect yourself with free and safe modern contraceptives available in the health centers. Visit the health center nearest to you for family planning advice'*. This message is aimed at raising their perception of the consequences of unprotected sex and to motivate decisions for adopting a method of modern contraceptive. Respondents who use modern contraceptive method consistently (PAPM Stage 7) received text messages and cues that remind them to always use modern contraceptives, like*'have you used your modern contraceptives this month? Visit the health centre nearest to you for family planning services,'*while those who complain of side effects had *'remember to protect yourself this month from unwanted pregnancy. Visit any health centre nearest to you for advice if you observe any side effect with your family planning method.'* Notification messages from the mobile phone operators were also received by the researchers as confirmation for delivery of family planning messages sent to participants. Each participant in the intervention group received a total of six family planning messages during the six months follow up period.

Participants in the control group did not receive the intervention. This research however assumed that participants in the control group obtained modern contraceptive information and motivation to adopt a method conventionally from available health facilities and mass media.

2.7 Outcome Variables

i. **Primary outcome variable**.

- Use of modern contraceptives was determined as current use, if the respondent or her sexual partner used any of the modern contraceptive methods at any time in the last three months prior to the survey;

ii. Secondary outcome variables

- Awareness of modern contraceptive was assessed as the proportion of respondents who have heard about modern contraceptives and can mention any one method.
- Use of modern contraceptives was determined as consistent, if respondent or her sexual partner used only one modern contraceptive method at all times in the last three months prior to the survey;
- Ever used, if respondent or her sexual partner had used any modern contraceptive method at one time or the other in the past except in the last three months prior to the survey;
- Discontinued use, if the respondents or her sexual partner used any modern contraceptive method at the third month of the study but not at the sixth month and
- New starter, if respondents or her sexual partner used any method of modern contraceptives at the sixth month of the study but not at the third month.

2.8 Data Analysis

Data analyses was done with Statistical Package for Social Sciences (SPSS) computer software (version 15) and the results presented on Frequency tables. The test of statistical significance was done using Chi square (X^2) test at 95% level of significance. The effect of the intervention on the use and consistent use of modern contraceptive was determined by comparing the intra-group changes in these outcome variables in the intervention and control groups [36].

i.e. Effect = $(6^{th}$ month follow up - baseline$)_{intervention}$ – $(6^{th}$ month follow up - baseline$)_{control}$.

Ethical approval for this research was obtained from the Ethics and Research Review Board of the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. Written informed consent were also obtained from respondents before the commencement of the study.

3. RESULTS

Table 1 shows that the socio-demographic characteristics of respondents in both groups were similar ($p \geq 0.05$) except for ages 25 – 34 years where there was a statistically significant difference between respondents in the intervention group (n = 102; 52%) and the control (n = 71; 38.6%) P = 0.01. Majority of the respondents were married, 170 (86.7%) in the intervention group and 146 (79.3%) in the control. More than half of the respondents in the

intervention group (n = 150; 76.5%) and in the control (n = 139; 75.5%) had secondary education and above.

Table 2 shows that majority of the respondents were multiparous in the intervention (n = 90; 45.92%) and in the control (n = 73; 39.67%) *P* = 0.18. Similarly majority of them have two to four male children alive in the intervention (n = 96; 54.24%) and in the control group (n = 63; 47.37%) *P* = 0.25.

At baseline respondents in both study groups were similar in their awareness and sources of information on modern contraceptives except for sources like friends and husbands where respondents were more in the control group (*P* = 0.01). The commonest sources of information in both groups however were health practitioners, mass media and friends (Table 3).

Although respondents who consistently used a method of modern contraceptive were similar in both groups at baseline (*P* = 0.07), those who had ever used or currently used any method were more in the control group than the intervention group (*P* < 0.01). Male condoms, injectable and oral pills were the modern contraceptive methods most commonly known by respondents in both groups at baseline (*P* ≥ 0.05) Table 4.

Table 5 shows that respondents who currently used any method of modern contraceptives increased from 55 (28.1%) to 82 (41.8%) in the intervention group (*P* = 0.004), but decreased from 85 (46.2%) to 71 (38.6%) in the control (*P* = 0.14). Similarly consistent users of modern contraceptives increased from 37 (18.9%) 75 (38.3%) in the intervention group (*P* <0.001) but decreased from 49 (26.6%) to 41 (22.2%) in the control (*P* = 0.33). Male condom however, was the most common modern contraceptive method used by respondents in both groups before and at the end of the study (*P* > 0.05).

Table 1. Socio-demographic characteristics of respondents at baseline.

Characteristics of respondents	Intervention group (n = 196)	Control group (n = 184)	*P* value
	Frequency (%)	Frequency (%)	
Age			
15 – 24	29 (14.8)	31 (16.8)	0.67
25 – 34	102 (52.0)	71 (38.6)	0.01
35 – 44	58 (29.6)	66 (35.9)	0.23
45 - 49	7 (3.6)	16 (8.7)	0.05
Marital status			
Married	170 (86.7)	146 (79.3)	0.06
Separated/Divorced	20(10.2)	23 (12.5)	0.52
Widow	6 (3.1)	15 (8.2)	0.04
Denomination			
Catholic	36 (18.4)	40 (21.7)	0.44
Protestant	51 (26.0)	60 (32.6)	0.18
Pentecostal	100 (51.0)	82 (44.6)	0.22
Others(traditional, muslims)	9 (4.6)	2 (1.1)	0.06
Occupation			
Farming	58 (29.6)	58 (31.5)	0.74
Fishing	2 (1.0)	1 (0.6)	1.0
Trading	73 (37.3)	58 (31.5)	0.28
Public Servant	30 (15.3)	34 (18.5)	0.42
Unemployed/Housewife	33 (16.8)	33 (17.9)	0.79
Level of education			
None	2 (1.0)	4 (2.2)	0.44
Primary	44 (22.5)	41 (22.3)	1.0
Secondary	121 (61.7)	114 (62.0)	1.0
Tertiary	29 (14.8)	25 (13.5)	0.77

p ≥ 0.05 No statistically significant difference

Table 2. Reproductive characteristics of respondents at baseline

Variables	Intervention	Control	*P* value
	Freq (%)	Freq (%)	
Parity	(n = 196)	(n = 184)	
0	3 (1.53)	0 (0)	0.25
1	33 (16.84)	20 (10.87)	0.10
2 - 4	90 (45.92)	73 (39.67)	0.18
≥ 5	54 (27.55)	40 (21.74)	0.19
Non response	16 (8.16)	51 (27.72)	< 0.001
No of living male children	n = 177	n = 133	
0	21 (11.86)	18 (13.53)	0.73
1	52 (29.38)	49 (36.84)	0.18
2 - 4	96 (54.24)	63 (47.37)	0.25
≥5	8 (4.52)	3 (2.26)	0.36
No of living female children	n = 177	n = 133	
0	37 (20.90)	20 (15.04)	0.24
1	54 (30.52)	42 (31.58)	0.90
2 - 4	81 (45.76)	66 (49.62)	0.57
≥ 5	5 (2.82)	5 (3.76)	0.75

P ≥ 0.05 No statistically significant difference

Table 3. Awareness and sources of information on modern contraceptives by respondents at baseline

Variables	Intervention group (n = 196)		Control group (n = 182)		*P* value
	freq	%	freq	%	
Awareness					
Yes	196	100.0	182	98.9	0.14
No	0	0	2	1.1	
Sources of information#					
Health professional*	130	66.3	131	72.0	0.24
Mass media*	64	32.7	57	31.3	0.78
Friends*	43	21.9	62	34.1	0.01
School teacher	36	18.4	30	16.5	0.63
Husband	19	9.7	36	19.8	0.01
Club meeting	9	4.6	17	9.3	0.07
Siblings	34	17.3	31	17.0	0.94
Church	13	6.6	23	12.6	0.05
Books & Magazines	25	12.8	37	20.3	0.05

*# multiple options; * commonest source; P ≥ 0.05 No statistically significant difference*

Table 4. Utilization pattern of MC and methods known to respondents at baseline

Variables[#]	Intervention group (n = 196)		Control group (n = 184)		*P* value
	Frequency	%	Frequency	%	
Utilization pattern					
Ever used	89	45.4	120	65.2	<0.01
Current use	55	28.1	85	46.2	<0.01
Consistent use	37	18.9	49	26.6	0.07
MC methods known					
Male condom*	129	65.8	126	68.5	0.48
Injectibles*	106	54.1	84	45.7	0.12
Combined pills*	78	39.8	72	39.1	0.96
IUCD	29	14.8	12	6.5	0.01
Norplant	6	3.1	13	7.1	0.07
Tubal ligation	9	4.6	3	1.6	0.10

*# multiple options; P ≥ 0.05 No statistically significant difference; *commonly known*

Table 6 shows that the net effect of the intervention was improvement in current use of modern contraceptive by 21.3% (*P* = 0.01) and consistent use by 23.8% (*P* = 0.002).

Table 7 shows that respondents who discontinued the use of modern contraceptives at the end of the study were less in the intervention group (n =11; 19.6%) than in the control (n = 28; 33.7%) RR 0.58; 95% CI 0.32 – 1.07. New starters were however more in the intervention group (n = 37; 26.4%) than in the control (n = 16; 15.8%) RR 1.67, 95% CI 0.98 – 2.83.

Table 5. Utilization pattern of MC and methods used by respondents before and after intervention

Variables#	Intervention			Control		
	Baseline (%)	6th month (%)	p-value	Baseline (%)	6th month (%)	p-value
Use of MC		**n = 196**			**n =184**	
Current use	55 (28.1)	82 (41.8)	0.004	85 (46.2)	71 (38.6)	0.14
Consistent use	37 (18.9)	75 (38.3)	< 0.001	49 (26.6)	41(22.2)	0.33
Methods used	n = 55	n = 82		n = 85	n = 71	
Male condom	25 (45.5)	43 (52.4)	0.42	40 (47.1)	32 (45.1)	0.80
Injectibles	16 (29.1)	26 (31.7)	0.74	9 (10.6)	6 (8.5)	0.65
Pills	5 (9.1)	6 (7.3)	0.71	20 (23.5)	15 (21.1)	0.72
Others (IUCD, Post-coital prevention tablets)	9 (16.4)	7 (8.5)	0.16	19 (22.4)	10 (14.1)	0.19

 # multiple options, P ≥ 0.05 no statistically significant difference

Table 6. Overall effect of intervention on use of modern contraceptives by respondents

Variable	Baseline		After intervention		% change within study groups after intervention	% change between study groups after intervention	*P*-value
	Frequency	%	Frequency	%			
Current use							
Intervention (n=196)	55	28.1	82	41.8	13.7%	21.3%	0.01
Control (n=184)	85	46.2	71	38.6	-7.6%		
Consistent use							
Intervention (n=196)	37	18.9	75	38.3	19.4%	23.8%	0.002
Control (n=184)	49	26.6	41	22.2	-4.4%		

P < 0.05 statistically significant difference

Table 7. Respondents who currently use MC at the 3rd and 6th month of the study

Study group	3rd month		6th month	
	MC use	Freq (%)	MC use	Freq (%)
Intervention group (n = 196)	Yes	56 (28.6)	Yes	45 (80.4)
			No	11 (19.6)¶
	No	140 (71.4)	Yes	37 (26.4)*
			No	103 (73.6)
Control group (n = 184)	Yes	83 (45.1)	Yes	55 (66.3)
			No	28 (33.7)¶
	No	101 (54.9)	Yes	16 (15.8)*
			No	85 (84.2)

*MC = modern contraceptives, ¶ Discontinued use of MC (RR 0.58; 95% CI 0.32 – 1.07), * new starters (RR 1.67, 95% CI 0.98 – 2.83)*

4. DISCUSSION

The conventional approach to motivating the use of modern contraceptives in Nigeria has been by family planning education conducted at health facilities and the mass media. This quasi-experimental study however compared this conventional approach with a community based family planning education followed by reminders using mobile phone technology among rural women of child bearing age. The awareness of modern contraceptives among rural women of child bearing age in Rivers State was found to be very high. Almost all the women who participated in the intervention and control groups were aware of at least one modern method of contraception. The level of modern contraceptive awareness has also been reported in other studies to be similarly high [13–15]. This study also showed that at baseline, majority of the participants got information on modern contraceptives from health professional in health facilities followed by mass media and friends. This is consistent with the conventional approach to family planning education. Similar sources has also been reported as the commonest sources of contraceptive information in other studies [2,19,37,38]. Male condoms, injectable contraceptives and oral pills were reported by respondents as the commonly known modern contraceptive methods while the insertions and other long acting contraceptive were reportedly less known. These methods of modern contraceptive known to women in this study also reflected on the methods commonly used by them. Majority of the women relied on male condoms, injectable and oral contraceptive pills for contraception. These choices were however not influenced by the intervention ($P \geq 0.05$). Similar studies have also documented male condoms, injectable and oral contraceptive pills as the most commonly used modern method of contraception by women of child bearing age [2,12,19,38]. Why these methods were the most used was not determined in this study, however this pattern of use may be a reflection of the modern contraceptive methods available in rural areas or simply that it is convenient to these rural women. Convenience, effectiveness and absence of side effects has also been reported as reasons for choice and preference of a modern contraceptive method [19]. It is also possible that their choices are limited by their knowledge. Sheeha reported that gaps in knowledge of modern contraceptives restricted its use among Saudi women [39]. The long acting modern contraceptive methods like IUCD and Norplants, were also less known by rural women in this study.

Compared with the conventional health facility based approach to family planning education, this study showed that community based approach to contraceptive education followed by text message reminders significantly increased modern contraceptive use among rural women of child bearing age ($P = 0.0042$). Family planning education at the community level has also been shown to improve contraceptive use among women of reproductive age [40]. Using the control participants, this study monitored the changes in modern contraceptive use which occur naturally overtime as a result of the conventional health facility based approach. However when this change was discounted for in the intervention group, the net effect of the community based approach to family planning education and text message reminders was found to be a 21.3% improvement in current use of modern contraceptive among rural women of child bearing age ($P = 0.01$). Furthermore this study showed that community based approach to family planning education improved the consistent use of modern contraceptives significantly ($P < 0.001$) compared to the conventional health facility based approach. The net effect similarly was an improvement in the consistent use of modern contraceptive by 23.8% ($P = 0.002$).

We hypothesized that a community based approach to family planning education among rural women of child bearing age reinforced by tailored family planning text messages which address barriers to modern contraceptive use, could change their perceptions on the use of modern contraceptives and thus influence their decision making process. Among women of child bearing age using any method of modern contraceptives, although women who received community based family planning education followed by text message reminders were less likely to discontinue modern contraceptive use, this was not statistically significant (RR 0.58; 95% CI 0.32 – 1.07). Furthermore among women who were not using any method, women who had community based family planning education and text message reminders were more likely to be new starters than those who had the conventional health facility based family planning education. This finding however was also not statistically significant (RR 1.67, 95% CI 0.98 – 2.83).

This study has shown that a community based approach to family planning education and text message reminders is an effective method for improving the use of modern contraceptives among women in rural and resource limited areas in Rivers State, Nigeria. More than half of the respondents in this study reported acquiring information on modern contraceptives from health professionals. The implication of this finding therefore is that if modern contraceptive use among rural women of childbearing age is to be improved upon, community health extension workers who are closest to them can be further trained to improve their capacity to provide accurate contraceptive information and counseling that can address negative perceptions and barriers to use or continuation of use of modern contraceptives in rural communities where fertility rate is also higher. Furthermore health facilities providing family planning services can also integrate into their systems, a follow up mechanism leveraging on the cost effective and reliable mobile phone technology.

This study did not assess unmet needs and satisfaction with modern contraceptive methods which were beyond its scope. However the reproductive characteristics of the respondents, shows that majority of them are multiparous with two to four male children alive. In a patriarchal society and harsh economy like in Nigeria, having two to four living male children may suggest a satisfaction with family size and hence the desire for child spacing or permanent limitation of family size and the need for family planning services. This study showed statistically significant differences in respondents who were aged 25 – 34 years and widows in both study groups. Although the age of marriage of respondents was not assessed, the observed statistically significant differences in these socio-demographic variables may reflect an underlying reason for their desires for contraception and not necessarily their need for contraception. In other words, while the younger respondents in the intervention group may have desired modern contraceptive methods for purposes of spacing pregnancy, the older respondents and widows in the control, may have desired it for permanent limitation of pregnancy. Furthermore there was a statistically significant difference in non-response of participants to the question on parity in the study groups. This difference may have arisen from differences in cultural belief which forbid the counting of one's children [20].

The limitations of this study may arise from the fact that participants were not randomized into the intervention and control arms because of the quasi-experimental design adopted for the study; there were also statistically significant differences in the respondents who were aged 25 – 34 years and widows in the study groups. Data collection was based entirely on responses provided by respondents. Furthermore respondents were assumed to have read the text messages since data on direct feedback messages from the respondents were not collected.

5. CONCLUSION

Community-based family planning education and text message reminder is more effective than the conventional health facility based approach, in improving modern contraceptive use among rural women of child bearing age in Rivers State Nigeria. This community based approach can be integrated into family planning programs by its program managers in order to ensure improved utilization of modern contraceptives in low resource areas. Community health extension workers can be periodically trained and equipped to deliver quality family planning services among child bearing women in rural areas.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision, Key Findings and Advance

Tables. Working Paper No. ESA/P/WP.241; 2015.

2. Avidime S, Aku-Akai L, Mohammed AZ, Adaji S, Shittu O, Ejembi C. Fertility intentions, contraceptive awareness and contraceptive use among women in three communities in Northern Nigeria. Afr. J. Reprod. Health. 2010; 14(3):65-70.
3. National Population Commission. Nigeria Demographic and Health Survey; 2013. Available:www.population.gov.ng (Accessed June 30, 2014)
4. Choucri N. Population and conflict: New dimensions of population dynamics. Policy Development Studies, No. 8: United Nations Fund for Population Activities; 1983.
5. Osotimehin B. Countdown to 2015 for maternal, newborn and child survival. Family planning as a critical component of sustainable global development. Glob Health Action. 2015;8. DOI:http://dx.doi.org/10.3402/gha.v8.29978
6. Federal Government of Nigeria. National population policy for development, unity and self-reliance, Ikoyi, Lagos, Nigeria. Federal Ministry of Health; 1988.
7. Igbodekwe FC, Oladimeji O, Oladimeji KE, Adeoye IA, Akpa OM, Lawson L. Utilisation of modern contraceptive among women of childbearing age in resource constraint setting: Evidence from 2008 national demographic and health survey in Nigeria. Journal of Health Science. 2014;4(3):72-78.
8. Tsui AO, McDonald-Mosley R, Burke AE. Family planning and the burden of unintended pregnancies. Epidemiol Rev. 2010;32:152–174.
9. National Population Commission. Nigeria Demographic and Health Survey; 2008. Available:www.population.gov.ng (Accessed June 25, 2011)
10. Odusina EK, Ugal DB, Olaposi O. Socio-economic status, contraceptive knowledge and use among rural women in Ikeji Arakeji, Osun State, Nigeria. Afro Asian Journal of Social Sciences. 2012;3(3.2):1-10
11. Adeyemo AR, Oladipupo A, Omisore AO. Knowledge and practice of contraception among women of reproductive ages in South West, Nigeria The International Journal of Engineering and Science. 2012;1(2):70-76.
12. Omo-Aghoja LO, Omo-Aghoja VW, Aghoja CO, Okonofua FE, Aghedo O, Umueri C, Otayohwo R, Feyi-Waboso P, Onowhakpor EA, Inikori KA. Factors associated with the knowledge, practice and perceptions of contraception in rural Southern Nigeria. Ghana Medical Journal. 2009;43(3):115-121.
13. Oyedokun AO. Determinants of contraceptive usage: Lessons from women in Osun State, Nigeria. Journal of Humanities and Social Sciences. 2007; 1(2):1-14.
14. Olugbenga-Bello AI, Abodunrin OL, Adeomi AA. Contraceptive practices among women in rural communities in South-Western Nigeria. Global Journal of Medical Research. 2011; 11(2):1-8.
15. Osemwenkha SO. Gender issues in contraceptive use among educated women in Edo state, Nigeria. African Health Sciences. 2004;4(1):40–49.
16. Odimegwu CO. Family planning attitudes and use in Nigeria: A factor analysis. International Family Plannig Perspectives. 1999;25(2):86–91.
17. Duze MC, Mohammed IZ. Male knowledge, attitudes, and family planning practices in Northern Nigeria. Afr J Reprod Health. 2006;10(3):53-65.
18. Chigbu B, Onwere S, Aluka C, Kamanu C, Okoro O, Feyi-Waboso P. Contraceptive choices of women in rural South Eastern Nigeria. Niger J Clin Pract. 2010; 13(2):195-199.
19. Chigbu B, Onwere S, Aluka C, Kamanu C, Okoro O, Feyi-Waboso P. Contraceptive choices of women in rural South Eastern Nigeria. Niger J Clin Pract. 2010; 13(2):195-199.
20. Nwosu UM, Eke RA Chigbu LN. Factors influencing the practice of modern family planning in rural communities of Abia State, Nigeria. ABSU Journal of Environment, Science and Technology. 2011;1:128–136.
21. Fry JP, Neff RA. Periodic prompts and reminders in health promotion and health behavior interventions: Systematic review. J Med Internet Res. 2009;11(2):16. [PubMed: 19632970]

22. Cole-Lewis H, Kershaw T. Text messaging as a tool for behavior change in disease prevention and management. Epidemiol Rev. 2010;32(1):56-69.

23. Lester RT, Ritvo P, Mills EJ, Kariri A, Karanja S, Chung MH, Jack W, Habyarimana J, Sadatsafavi M, Najafzadeh M, Marra CA, Estambale B, Ngugi E, Ball TB, Thabane L, Gelmon LJ, Kimani J, Ackers M, Plummer FA. Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1): A randomised trial. Lancet. 2010;376:1838–45.

Available:www.thelancet.com

(Accessed Aug. 12, 2011)

24. Raifman JRG, Lanthorn HE, Rokicki S, Fink G. The impact of text message reminders on adherence to antimalarial treatment in Northern Ghana: A randomized trial. PLoS ONE. 2014; 9(10):109032.

DOI: 10.1371/journal.pone.0109032

25. Junod Perron N, et al. Text-messaging versus telephone reminders to reduce missed appointments in an academic primary care clinic: A randomized controlled trial. BMC Health Services Research. 2013;13:125.

26. Ifejika PI, Nwabeze GO, Ayanda JO, Asadu AN. Utilization of mobile phones as a communication channel in fish marketing enterprise among fishmongers in Western Nigeria's Kainji Lake Basin. Journal of Information Technology Impact. 2009; 9(2):107-114.

27. Kana MA, Tagurum YO, Hassan ZI, Afolanranmi TO, Ogbeyi GO, Difa JA, et al. Prevalence and determinants of contraceptive use in rural Northeastern Nigeria: Results of a mixed qualitative and quantitative assessment. Ann Nigerian Med. 2016;10:3-10.

28. Dayaratna V, Winfrey W, McGreevey W, Hardee K, Smith J, Mumford E, Sine J, Berg R. Reproductive health interventions: which ones work and what do they cost? The POLICY Project; 2000.

29. Elliott JO, Seals BF, Jacobson MP. Use of the precaution adoption process model to examine predictors of osteoprotective behavior in epilepsy. Seizure. 2007; 16:424–437.

30. Weinstein ND. The precaution adoption process. Health Psychol. 1988;7(4):355-86.

31. Federal Government of Nigeria. 2006 Population and housing census, Population distribution by age and sex. (States and LGAs). National Population Commission Abuja Nigeria; 2010.

32. Federal Republic of Nigeria. 2006 Census Final Results, Federal Republic of Nigeria Official Gazette. Abuja, Nigeria. 2009; 96(2).

33. Olojede AA, Adekunle AA, Samuel EA. Analysis of rural literacy as a panacea for socio-economy development of Nigeria. Int. J. Sociol. Anthropol. 2013;5(9):381-390.

34. Bamgboye EA. A Companion of Medical Statistics. 2nd Edition. Folbam Publishers, Ibadan; 2008.

35. Onwujekwe OE, Enemuoh JC, Ogbonna C, Mbachu C, Uzochukwu BSC, Lawson A Ndyanabangi B. Are modern contraceptives acceptable to people and where do they source them from across Nigeria? BMC International Health and Human Rights. 2013;13(7).

Available:http://www.biomedcentral.com/1472-698X/13/7

(Accessed Aug. 12, 2011)

36. Khurram Azmat S, Tasneem Shaikh B, Hameed W, Mustafa G, Hussain W, Asghar J, Ishaque M, Ahmed A, Bilgrami M. Impact of social franchising on contraceptive use when complemented by vouchers: A quasi-experimental study in rural Pakistan. PLoS ONE. 2013; 8(9):74260.

DOI: 10.1371/journal.pone.0074260

(Accessed June 30, 2014)

37. Mubita-Ngoma C, Chongo Kadantu M. Knowledge and use of modern family planning methods by rural women in Zambia. Curationis. 2010; 33(1):17-22

38. Mustafa R, Afreen U, Hashmi HA. Contraceptive knowledge, Attitude and practice among rural women. Journal of the College of Physicians and Surgeons Pakistan. 2008;18(9): 542-545.

39. Sheeha, MA. Awareness and Use of Contraceptives among Saudi Women Attending Primary Care Centers in Al-

Qassim, Saudi Arabia. International Journal of Health Sciences, Qassim University. 2010;4(1):11-21.

40. Sebastian MP, Khan ME, Kumari K, Idnani R. Increasing postpartum contraception in rural India: Evaluation of a community-based behavior change communication intervention. International Perspectives on Sexual and Reproductive Health. 2012; 38(2):68–77.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/22673