

# **Effect of a Multifaceted Intervention on Utilization of Primary Health Care for Maternal and Child Health Care in Rural Nigeria**

## **Authors**

<sup>1,2,3</sup>Friday Ebhodaghe Okonofua, <sup>4,1</sup>Lorretta Favour Chizomam Ntoimo, <sup>5,6</sup> Sanni Yaya, <sup>1</sup>Igboin Brian, <sup>7</sup>Ojuolape Solanke, <sup>1</sup>Chioma Ekwo, <sup>8</sup>Ermel Ameswue Kpogbe Johnson, <sup>8</sup>Issiaka Sombie, <sup>1</sup>Wilson Imongan

From <sup>1</sup>Women's Health and Action Research Centre (WHARC), Benin City, Nigeria; <sup>2</sup>Centre Leader, Centre of Excellence in Reproductive Health Innovation, University of Benin, Benin City, Nigeria; <sup>3</sup>Department of Obstetrics and Gynaecology, University of Benin and University of Benin Teaching Hospital, Nigeria; <sup>4</sup>Department of Demography and Social Statistics, Federal University Oye Ekiti, Nigeria; <sup>5</sup>School of International Development and Global Studies, University of Ottawa, Canada; <sup>6</sup>The George Institute for Global Health, University of Oxford, Oxford, United Kingdom; <sup>7</sup>Federal Ministry of Health, Nigeria; and <sup>8</sup>West African Health Organization, Burkina Faso.

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## **Address for Correspondence**

Professor Friday Ebhodaghe Okonofua  
Women's Health and Action Research Centre  
Km 11, Benin-Lagos Expressway,  
Opposite Evidence of the Gospel Church  
Igue-Iheyia. Benin City. Edo State. Nigeria  
**Email: feokonofua@yahoo.co.uk**

## Abstract

**Introduction:** Although several studies have reported low utilization of primary health care for skilled maternal and child care in Nigeria, limited empirical research has addressed this challenge. The objective of this study is to determine the effectiveness of a set of multi-faceted interventions designed to increase the access of rural women to antenatal, intrapartum, postpartum, and childhood immunization services offered in primary health care facilities.

**Methods:** The study was a separate sample pretest-posttest quasi-experimental research conducted in 20 communities in Esan South East and Etsako East Local Government Areas in Edo State, Nigeria. A mixed-method research which includes a household survey with 1,408 randomly selected women of reproductive age was conducted at baseline to identify the prevalence and determinants of use and non-use of PHCs for skilled maternal and child care. Using the results of the baseline studies, community-led intervention activities were designed and implemented over 24 months. Subsequently, an endline household survey was conducted with a separate sample of 1411 women of reproductive age. The baseline and end-line data were analysed and compared using univariate, bivariate and logistic regression statistical methods.

**Results:** The results showed a high-level effectiveness of the interventions in improving the uptake of antenatal, delivery, and postnatal care, and childhood immunisation services. After controlling for possible confounding variables, the likelihood of using PHCs for antenatal care increased nearly four-folds, delivery care three-folds, postnatal care nearly four folds, and childhood immunization nearly three-folds, as compared to the baseline. However, a few women still reported cost of services, and gender related issues as reasons for non-use.

**Conclusion:** We conclude that community-led interventions that address the specific concerns of women related to the bottlenecks they experience in accessing care in primary health centres are effective in increasing demand for skilled pregnancy and child care in rural Nigeria.

## **Summary Box**

### **What is already known?**

- Existing evidence indicate that many women in Nigeria, especially those in rural areas use unskilled traditional birth attendants, increasing their risks of maternal mortality.
- Primary health care has been designed as accessible, and effective care for use by rural women to access skilled maternal and child care.
- Past studies in Nigeria document gross underutilization of primary health care by rural women for skilled pregnancy care even when they are located within their locations, while the barriers to use have been well documented.

### **What are the new findings?**

- Composite, community-led interventions increased the demand for skilled maternal and child health care services in PHCs three to four folds.
- Addressing the concerns identified by women can increase the use of primary health centres for skilled maternal and child care in rural areas.
- Establishment of a community health fund managed by community members themselves reduced the burden of cost of care, and stimulated demand for skilled care.

### **What do the new findings imply?**

- The provision of PHCs in rural communities is not sufficient, governments and implementing agencies must also work with communities to ensure the use of PHCs for skilled maternal and child care.
- Community engagements leading to community-led interventions that address the specific concerns of women related to the bottlenecks they experience in accessing care in primary health centres are effective in increasing demand for skilled maternal and child care in rural Nigeria.
- In view of the high rate of poverty in rural communities, the removal of out-of-pocket payments, and increased public funding of primary health care need to be considered as matters of equity and social justice, necessary to increase women's use of PHCs for skilled pregnancy care and prevent maternal mortality in rural Nigeria.

## INTRODUCTION

Over the past several years, there has been a global movement towards reducing high rates of maternal and under-five mortality as essential prerequisites for socio-economic development. It is for this reason that the reduction in under-five and maternal mortality rates were included as major milestones to be attained in the Millennium Development Goals, and now the Sustainable Development Goals [1,2]. More recently, at the international conference organized by the UNFPA to celebrate 25 years after the ICPD, world leaders from several countries made substantive commitments to ensure the attainment of zero preventable maternal deaths globally by 2030 [3].

It is evident that if this new vision is to be reached globally, countries such as Nigeria with high rates of under-five and maternal mortality would require specific attention. Nigeria's maternal mortality rate of 814/100,000 live births, with an estimated 58,000 annual maternal deaths, and under-five mortality of 117/100,000 live births are currently among the world's highest [4,5]. We conjecture that if an accelerated rate of decline in maternal and under-five mortality is to be accomplished, the country would need to focus specific interventions on its most vulnerable citizens.

Several lines of research have revealed that women in rural communities in Nigeria are at higher risk of maternal mortality as compared to those in urban areas [6,7]. This is largely due to the limited access of rural women to skilled birth attendants because of the relative lack of functional public and private health facilities in rural locations [8]. In contrast, there is evidence that rural women use unskilled traditional birth attendants, increasing their risks of mortality when they experience severe obstetric complications [9,10]. While there has been policies and interventions that seek to address maternal and child mortality prevention and maternal health care access in Nigeria, only few of such interventions have focussed specifically on rural communities, where needs are more severe and the prevention of maternal and child mortality more urgent.

The Nigerian health authorities have put together Primary Healthcare Centres (PHCs) in many parts of the country and identified them as the entry points for women seeking skilled pregnancy (antenatal, intrapartum, and post-natal) and child care [11–13]. The PHCs are located in administrative wards and within less than 5 kilometers distance to residential areas. They are managed by 774 Local Government Areas (LGAs) in the country. Each LGA has between 10-12 wards, with each ward consisting of about 5000 persons. This pattern of distribution means that the PHCs are available and accessible for use by widely disperse populations including women in hard-to-reach rural populations. There are presently about 36,000 PHCs in the country, with a large proportion located in rural communities. Under this arrangement, women living in rural wards are expected to seek skilled pregnancy care in the PHCs closest to them and can only be referred to higher levels of care (General and Specialist Hospitals) if they experience severe complications. Despite this arrangement, there is evidence that many pregnant women do not use existing PHCs for maternity care but rather use traditional or home-based methods [14–16].

It is against this background that we began an intervention research in two rural LGAs in Edo State, south-south Nigeria in 2015 to increase the use of PHCs for skilled pregnancy care. Through formative research, we first identified that less than 47% of pregnant women use any of the

available PHCs for care [16]. We further ascertained through mixed qualitative research that these were due to perceptions relating to poor quality services, high cost of services, poor roads and transportation difficulty, gender and cultural issues, and perceptions that PHCs may not be the appropriate places for women to receive antenatal and delivery care [10,17–19]. To address these concerns, we worked with the community leaders in collaboration with other stakeholders to design interventions to address the bottlenecks identified as preventing the use of skilled care by pregnant women in the communities. The objective of this paper is to report the effectiveness of the intervention in increasing the access of women in the communities to antenatal, intrapartum, postpartum and childhood immunization services offered in PHCs. Also reported is the most important reasons for use and non-use of the PHCs before and after the intervention. We believe that the results have implications for demand generation for skilled pregnancy and child care, and the reduction of maternal and under-five mortality in rural communities.

## **METHODS**

### **Study setting**

This study was conducted in two rural LGAs (Esan South East and Etsako East) in Edo State, Nigeria from December 2015 to November 2020 by the Women’s Health and Action Research Centre (WHARC), Benin City, Nigeria in collaboration with the University of Ottawa, Canada. Nigeria is made up of thirty-six states and a Federal Capital Territory, Abuja. Edo State is one of Nigeria’s thirty-six states located in the South-south region. The thirty-six states are further divided into LGAs, each LGA is made up of ten political/health wards, and a ward comprises several communities or villages. Each ward has at least one PHC. The PHCs provide basic obstetric care services comprising antenatal, delivery and postnatal care, administration of antibiotics, manual removal of the placenta, removal of retained products of conception, assisted vaginal delivery possibly with a vacuum extractor, basic neonatal care including neonatal resuscitation, and immunization services.

### **Study design**

The project was originally designed as a randomized control trial [20] but deliberations during the intervention design workshop on the results and other facts from the baseline indicated that effective randomization will be difficult to achieve in the project location. Thus, stakeholders at the workshop advised a change to a quasi-experiment - separate sample pretest-posttest design. The study was conducted in three phases: pretest (baseline), intervention, and posttest (endline). A mixed method baseline research comprising a household survey with ever-married women aged 15-45 years, focus groups discussions with women and men in a marital union, key informant interviews with health providers and government officials, and community conversations with elders was conducted at baseline from July 29 to August 16, 2017. The intervention was implemented simultaneously from January 2018 to March, 2020. At the end of the intervention, an endline household survey was conducted between June 24 and July 6, 2020 to evaluate the effect of the intervention.

### **Sampling technique and sample size**

The effect of the intervention was measured using a household survey with ever married women aged 15-45, at baseline and endline. The sample size at both baseline and endline was 1,318. To adjust for non-response, 10% was added to derive a sample size of 1,450 (725 per LGA). At

baseline, twenty communities were randomly selected from eight wards in the two LGAs (ten communities per LGA), and a total of 1,408 women were successfully interviewed from 3,462 households. The details of the sampling technique have been described elsewhere [16]. The intervention activities were implemented in two out of the eight wards, one in Esan South East and one in Etsako East. The two wards consist of 31 communities and there are two PHCs in each ward. All the intervention activities were implemented in these four PHCs and the communities in the two intervention wards. At the end survey, a separate sample of ever married women ages 15-45 were randomly selected from 3116 households in 20 randomly selected communities in the intervention wards. A total of 1,411 women were successfully interviewed.

## **Intervention**

The baseline results were presented in an intervention design workshop attended by the project community leaders, PHC providers, and other stakeholders such as the Federal Ministry of Health, Edo State Ministry of health, Edo State Primary Health Care Development agency, among others. Using the inputs from stakeholders, a set of six intervention activities were developed by the research team and the communities. The interventions were implemented simultaneously through the Ward Development Committees (WDC) in each LGA. The WDC, an initiative of the National PHC Development Agency, oversees the activities of PHCs in the wards, and serve as agents in health-related interventions in the communities [21]. The membership is drawn from the communities in a ward as approved by the traditional ruler, with one of them serving as the Chairman. The interventions included the following:

- 1) Memorandum of understanding (MOU) with transport business owners. This was to address the barrier of transportation. The WDC invited and registered interested transport business owners in the communities, into the intervention project. The transport owners committed to make their transport service available to pregnant women in case of emergency at specified rates that was paid from the community health fund, which is described below.
- 2) Community health fund. This was a local community fund-raising and contributory insurance called “Igho Omoh”(meaning “money to protect the child”) and “Ikpagic Omo” (meaning “financial savings for the child”) for funding of maternal and new-born health care. Pregnant women registered with ₦2000 (USD 5.26), which could be paid in instalments. A registration card was issued to the women which contains her details such as name, address, telephone contact, telephone numbers of her partner, the telephone numbers of the WDC chairman, and the rapid SMS keyword and telephone number. A community-level fund raising activity took place bi-annually to support the scheme. Women who registered in this fund were entitled to free delivery care which cost about ₦4,500 (USD 11.84) on average for normal delivery, and to access the transportation and Rapid SMS interventions.
- 3) Rapid SMS called Text4Life. This is a real-time two-way communication between a pregnant woman in distress, the WDC Chairman, and PHC nurse, using a mobile phone. The woman triggers an alert-system by sending a keyword to a dedicated phone number configured to a central server. The woman gets an automated feedback from the server to wait. At the same time, a dual SMS with the woman’s name and address is relayed to WDC Chairman and the nurse, reporting an emergency. The WDC chairman calls one of the transporters in the project MOU to pick her and the nurse prepares to receive her. Telephones were given to the WDC chairmen, the nurse in-charge at the PHCs, and the few women who had no telephone. The women and their partners

were taught how to use Text4Life during registration in the community health fund, and antenatal care visits.

4) Drug Revolving Fund (DRF). A DRF was set up for each of the four project PHCs. The WDC members and the project PHC providers were trained by the Edo State Ministry of Health on the techniques of managing a DRF. This ensured the availability of essential drugs in the project PHCs at affordable prices.

5) Community Health Talks. Community sensitization and health talks led by the WDC took place regularly in all the project communities. The WDC were taught by the project technical committee to implement the health talks, some of which took place on a house-to-house basis. We also produced and distributed Behaviour Change Communication materials to women and their families on the importance of using PHCs during such talks.

6) Advocacy. An advocacy team was set up to identify stakeholders in the communities and government. The aim is to sustain the project's results through community commitment and ownership and policy makers' active support. This team ensured that the project PHCs had at least one nurse.

7) Staffing, training and retraining, and provision of basic equipment. Through advocacy with the LG council, the research team ensured that at least one nurse/midwife was in each of the project PHCs all through the intervention. The nurses/midwives were provided regular training on basic maternal and child care. In addition, delivery kits were supplied to the PHCs on a regular basis; mattress, bedsheet and pillows were replaced in the PHCs where these were either lacking or worn out; functional tricycles were provided by the LGA for transportation and referral of women; and personal protective equipment were supplied to the four PHCs at the time of out-break of the COVID-19 pandemic.

### **Data collection**

The same pretested household survey questionnaire was administered face-to-face by trained field assistants using computer assisted personal interview (CAPI) at baseline and after the intervention. The questionnaire consisted of five sections. Section one contained the respondents' socio-demographic characteristics; section 2 was on partners' and other family characteristics, section 3 contained questions on the respondents' reproductive history, section 4 was on antenatal, intrapartum and postnatal care experience for current pregnancy and births in the preceding five years, and section 5 contained questions on barriers to utilization of PHCs for maternal and child care.

### **Variables and measures**

The outcome variables were use of a PHC in the project wards for antenatal care (current pregnancy and most recent birth two years before each survey), delivery care, postnatal check-up for mother and child, and childhood immunization for child. The use of a PHC in the project wards was coded 1 whereas use of other facilities was coded 0 for each of the four outcomes. The explanatory variable was the survey period indicated as baseline and endline. The baseline was the reference category.

Drawing from previous studies and theoretical perspectives on utilization of maternal and child health services [22–26], some individual and family-level factors were added as control variables. This included age recorded in single years, highest level of education, and access to the media. A measure of access to the media (more, less and no exposure) was generated by aggregating the

responses to the frequency of listening to the radio, and watching a television. Another characteristic was religion categorised as Catholic, Other Christian, Islam, Traditionalist, and others. However, due to small numbers, Islam, Traditionalists, and others were merged for the multivariable analysis. Other characteristics included work status categorised as working and not working, age at marriage in single years; marital status categorised as married, living together, and formerly married (widowed, divorced and separated); type of union (monogamous and polygynous). The LGA was also added as a control variable to adjust for the effect of any differences by LGA. The respondents were also asked their most important reason for using or not using a PHC for skilled care. Multiple response options such as cost is too much, providers are not available, and quality of care among others were provided.

### **Analytical Approach**

The data were extracted from the CAPI device into SPSS version 20, and Stata 13 was used for analysis. The characteristics of all the respondents at baseline and endline, and the prevalence of the outcome variables were described using frequency, percentage, mean and standard deviation where appropriate. The difference in the outcomes between the two periods were presented as the difference between the percentage at baseline and percentage at endline. An assessment of significant difference in the characteristics of the respondents at the two periods were conducted with t-test for continuous variables, and a test of association for categorical variables using chi-square and Fishers exact test where the assumptions for Chi-square were not met. To determine the effect of the intervention on the utilization of PHCs for maternal and child care, binary logistic regression was conducted with the survey period as the explanatory variable. The respondents' socio-demographic and family characteristics were adjusted in the logit model. Alpha was set at 0.05, and all p values were two-sided. The result of the multiple response to the most important reason for use and non-use of a PHC for delivery care is presented as the number of responses per reason and the percentage.

## **RESULTS**

### **Profile of the study population**

A total of 2,819 women were involved in this study, 1,408 at baseline and 1,411 at endline. The characteristics of the study population at both the baseline and endline are presented in Table 1. The mean age of the women at baseline and endline was  $30\pm 7.0$  and  $31.9\pm 8.1$ , respectively, and most of them attained primary and secondary education. Slightly above one quarter of all the respondents had no exposure to the media (radio and television). The majority were of other Christian affiliation, married in a monogamous union, and had an average of 3.7 children. Most of the respondents at baseline and endline were working. The details on the type of work (not shown) shows that most of the respondents were self-employed.

### **Utilization of PHCs at baseline and endline**

The distribution of the study population by the outcome variables is presented in Table 2. The percentage who used the project PHCs for antenatal care increased from 52.6% at baseline to 76.6% at endline for currently pregnant women, and from 40.8% to 69.5% for recent births. The use of the project PHCs for delivery care increased from 31.8% at baseline to 59% at endline, and postnatal care in the PHCs increased from 41.2% at baseline to 69.5% at endline. The percentage

of women who used the PHCs for immunization services for their children also increased from 59.7% at baseline to 78.6% at endline. The relationship between the outcome indicators and the time periods were all statistically significant.

The odds of using a PHC in the project communities for each of the four outcomes at endline versus baseline is presented in Table 3. Holding marital status and other selected characteristics constant, the odds of utilizing a PHC in the project communities for antenatal care was significantly higher at endline relative to baseline (OR 3.87, CI: 1.14-4.77). The likelihood of using a PHC in the project communities for delivery care increased at endline compared to baseline (OR 3.88, CI: 3.22-4.69). The use of a PHC in the project sites for postnatal care was more likely at the endline than the baseline (OR 3.69, CI: 3.00-4.47). Compared to the baseline, the odds of using a PHC in the project communities for immunization increased at endline (OR 2.87, CI: 2.35-3.51).

Some of the control variables were significantly associated with the utilization of the PHCs in the project sites for the four outcome indicators. The odds of using a PHC for antenatal, delivery and postnatal care significantly decreased with a woman's age. Relative to women who had attained higher education, the likelihood of using a PHC for antenatal, delivery and postnatal care was higher among women with lower levels of education or none. Compared to Catholics, respondents of Islamic, traditional and other religious affiliation were more likely to use a PHC in the project sites for antenatal care, delivery care and immunization. Women who worked were less likely to use a PHC for immunization. Relative to the respondents who were married, those who were living together with a partner were less likely to use a PHC for postnatal care and immunization, and those who were formerly married were less likely to use a PHC for all the four outcomes. Age at marriage predicted lower odds of using the project PHCs for immunization. The higher the number of children the higher the likelihood of using the project PHCs for antenatal, delivery and postnatal care, and immunization. The use of the project sites was significantly lower in Etsako East LGA compared to Esan South East LGA.

### **Reasons for use and non-use of a PHC for delivery at baseline and endline**

The most important reasons for using and not using a PHC for delivery care are compared between baseline and endline. The N is the number of responses per reason not the number of respondents. The increase in the percentage of women who used a PHC at endline and the concurrent decline in the percentage who did not use a PHC is reflected in the larger number of responses for delivery care at endline compared to baseline, and the decline in the number of responses for non-use.

The reasons for use of a PHC are presented in Table 4. There was a decline at endline in the number of responses associated with cost, facility not too far from respondent's residence, family wanted it, adequate security and other reasons. On the contrary, the number of responses for facility always open, providers are available, good quality service, and husband wanted it increased at endline. The reasons with the largest number of responses at baseline were facility is not too far, good quality service, cost not too much, and providers available, but at endline, good quality service, providers are available, facility always open, and cost not too much attracted the largest number of responses.

The reasons for non-use of a PHC are presented in Table 5. At endline, the number of responses for cost too much, husband did not allow, family did not allow, no time because the baby came suddenly, no security and other reasons increased. In contrast, the number of responses for facility not open, no provider in the facility, facility too far, no transport, poor quality service and culture forbids declined. The highest decline in the most important reason for non-use of a PHC was in poor quality service and facility not open.

## **DISCUSSION**

The study was designed to determine the effectiveness of a multi-faceted set of interventions in increasing the uptake of skilled maternal and child care in two rural LGAs in Edo State, Nigeria. The results showed high level effectiveness of the interventions in improving the uptake of antenatal, delivery, and postnatal care, as well as childhood immunisation services by women in the LGAs. After controlling for possible confounding variables, the likelihood of use of PHCs for antenatal care among the rural women increased nearly four-folds, delivery care three-folds, postnatal care nearly four folds, and childhood immunization nearly three-folds as compared to the baseline. The effectiveness of the intervention is likely due to multiple factors, the most important being the design of the interventions to respond to the concerns raised by the women as responsible for their non-use of skilled pregnancy care. We particularly ensured that all concerns identified during the formative research were addressed in the various components of the intervention, leaving no areas for gaps and redundancies. The fact that the interventions were led by community WDC supported by community leaders also ensured high level intensity of the implementation of the interventions and promoted rapid community acceptance and uptake.

Due to the composite nature of the project activities, it is difficult to identify any one activity as being more pre-eminent in leveraging the success of the intervention. We understand that interventions are more likely to be impactful if they are community-driven and based on specific recommendations made by the immediate community [27]. Such approaches recognize the wisdom of community women and elders and enlist their full participation to increase project support and effectiveness, strengthening its impact and sustainability over time. Combined interventions that bring together multiple approaches and partners are also more likely to be effective than those based on single interventions [28–30].

To the best of our knowledge, this is one of a few interventions in sub-Saharan Africa that address the utilization of PHC services in rural communities for skilled pregnancy. Some of the intervention activities were particularly novel and helped to accentuate the effectiveness of the interventions. These included the engagement of taxi drivers with rapid SMS that linked drivers with pregnant women and the PHCs, and the development of community health insurance. The successful use of rapid SMS to improve health care delivery has been reported in some African countries [31,32]. In Nigeria, it has been used for birth registration reporting [33], but not for maternal and child health care delivery.

The community health insurance helped to solve the problem of out-of-pocket financing in PHCs which was identified by women in accessing maternal health care. Although health insurance has been found to increase health facility utilization [34–36], community health insurance as used in this intervention, has not been found to be generally effective and sustainable in many parts of the

world [37–39]. However, the fact that this was co-funded by donations from community members may have increased the value of this aspect of the intervention.

In this study, we investigated whether there were differences in the reasons given by women for use or non-use of PHCs before and after the intervention. This was to enable us to determine any residual areas of concern initially raised by the women that need to be further addressed. The results showed that the cost of services was important to women in their decision to use and not use PHC services. While some reported that the costs are not too high, a few reported that the high cost of services was responsible for their continued non-use of PHC services after the intervention. For rural communities where the level of poverty is high, it is to be expected that out of pocket payments for health care, and even health insurance contributions will have limited effects in generating demand for maternal health services. It is evident from the results of this study that health insurance or community funding of PHCs will not be adequate to bring all rural women to skilled pregnancy care. We believe that policies on active public funding of maternal health services that has featured as one of the components of universal health coverage [40–42], and which resulted in several governments offering free maternal and child health services in Nigeria [43–45], should be re-considered as an essential element in ensuring the use of PHCs by women for skilled pregnancy care [46].

Perceptions about the quality of skilled pregnancy care in PHCs also rated highly as remedial concerns by women even after the interventions. Although some respondents reported perceptions about low quality care as reasons for non-use of PHCs after the intervention, some others reported that facilities now open regularly, that providers were more readily available, and that PHC services are of better quality after the intervention. These results indicate that although perceptions about quality of services may have improved, there is continuing need to intensify efforts in addressing the quality gaps associated with service delivery in the PHCs.

Another barrier identified before and after the intervention was gender inequality and cultural barriers. Although none of the women reported cultural barriers after the intervention, a substantial number mentioned “husbands did not allow” as reasons for non-use of PHCs after the intervention. This indicates that although we applied gender transformative approaches during the study, including community conversations and interrogation with men and husbands, and dissemination of BCC materials which focussed on promoting gender inclusiveness in decision-making in the community, there is still much more to be achieved in addressing gender inequality as an essential element in promoting the use of PHCs for skilled pregnancy care in the communities. Clearly, gender inequality is an important bottleneck to address in efforts to enhance women’s use of skilled pregnancy care in rural Nigeria [18,40].

### **Limitations**

The study was designed as a “before and after” study evaluation. This design does not control possible threats to validity such as history and maturation, but with the use of a separate sample and the same questionnaire at the baseline and end survey, the design eliminates testing and instrumentation effect. Also, the personal characteristics of the respondents were adjusted in the statistical estimation. Furthermore, we are aware that during the five years duration of the project, no new interventions by government or related agencies related to the promotion of PHC usage or sexual and reproductive health and rights took place in the closely knit communities. There were

no projects of similar kind administered by civil society organizations or development partners in the area during the period. Thus, we are certain that the results obtained on PHC utilization in this study are reflective of the activities of our intervention and not necessarily due to the interplay of other activities. Further studies are recommended to estimate the real impact of similar interventions on the performance of the health system and the health of the populations in terms of quality-adjusted life years gained, disability-adjusted life years averted and life years gained.

### **Policy Recommendations**

The study has several policy and programmatic implementations. Although PHCs have been endorsed as the entry points into the formal health system by nearly all arms of government in Nigeria, not much has been achieved in ensuring the demand and use of PHCs for maternal and child care. The results of this study indicate that the provision of PHCs in rural communities is not sufficient. Governments and implementing agencies must also work with communities to ensure the use of PHCs. Community engagement as epitomised in this study can help to address the barriers that prevent women from using skilled pregnancy care and can help to link PHC service delivery with women in targeted communities. We recommend a gradual extension of this model for optimising primary health care to the entire Edo State, and Nigeria and in other parts of the world where similar circumstances prevail using the Scaling Impact approach developed and promoted by the International Development Research Centre, Canada [47].

Policymakers in Nigeria have identified the use of WDCs as a component of PHC delivery in rural communities. They act as agents of change, advocates, and promoters of PHC in communities where they serve. In 2018, the National Primary Health Care Development Agency renamed the programme as “Community Health Influencers, Promoters, and Services Programme (CHIPS)’ [48]. The results of this study suggest that WDCs or CHIPS or similar programmes aimed at mobilizing and engaging communities will be effective in increasing the demand for PHC services and improving the use of skilled maternal and child health care by rural women.

### **CONCLUSION**

We conclude that interventions that address the specific concerns of women and stakeholders about the bottlenecks associated with the use of PHCs are effective in increasing the demand for maternal and child health services and possibly result in decreased maternal and under-five mortality rate in the country.

### **Author affiliations**

<sup>1</sup>Women’s Health and Action Research Centre (WHARC), Benin City, Nigeria

<sup>2</sup>Centre of Excellence in Reproductive Health Innovation, University of Benin, Benin City, Nigeria

<sup>3</sup>Department of Obstetrics and Gynaecology, University of Benin and University of Benin Teaching Hospital, Nigeria

<sup>4</sup>Department of Demography and Social Statistics, Federal University Oye Ekiti, Nigeria

<sup>5</sup>School of International Development and Global Studies, University of Ottawa, Canada

<sup>6</sup>The George Institute for Global Health, University of Oxford, Oxford, United Kingdom

<sup>7</sup>Federal Ministry of Health, Nigeria

<sup>8</sup>West African Health Organization, Burkina Faso.

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## **Contributors**

FEO conceived the study, developed the methodology and wrote sections of the paper and revised the final draft. LFCN supervised the data collection, analysed the data and wrote sections of the paper. SY contributed to the conception of the study, and methodology. IB, TO and CE facilitated data collection and organisation. JO supervised the data collection and assisted in data analysis. JE and SI contributed to the study design; WI contributed to the study design, and supervised data collection. All authors approved the final version of the paper.

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## **Disclaimer**

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## **Competing Interests**

The authors have no competing interests to declare.

## **Patient consent for publication**

Not required.

## **Ethical Approval**

Ethical approval for the study was obtained from the National Health Research Ethics Committee (NHREC) of Nigeria – protocol number NHREC/01/01/2007 – 10/04/2017.

The communities were contacted through lead contact persons, and permission to undertake the study was obtained from the Heads (Odionwere) of the communities. Consent was also obtained from the Heads of individual Households identified for the study. The participating women were informed of the purpose of the study, and individual written informed consent was obtained from them to conduct the study. They were assured of confidentiality of information obtained, and that such information would only be used for the study and not for other purposes. No names or specific

contact information were obtained from the study participants. Only women that agreed to participate in the fully explained study were enlisted in the study.

### **Provenance and peer review**

Not commissioned; externally peer reviewed

### **Availability of Data and Materials**

The dataset used and analysed during the current study are available from the corresponding author on reasonable request.

### **ORCID iDs**

Friday E. Okonofua <http://orcid.org/0000-0002-8777-2606>

Lorretta FC Ntoimo <http://orcid.org/0000-0002-3218-5535>

Sanni Yaya <https://orcid.org/0000-0002-4876-6043>

Igboin Brian <http://orcid.org/0000-0002-3241-6110>

Solanke Ojuolape <http://orcid.org/0000-0001-6902-2740>

Chioma Ekwo <https://orcid.org/0000-0002-9840-2117>

Ernel A. K. Johnson <https://orcid.org/0000-0003-3663-5174>

Issiaka Sombie <https://orcid.org/0000-0001-9435-7198>

Wilson Imongan <https://orcid.org/0000-0001-7734-0626>

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Table 1: Profile of the study population

Variable	All (n=2,819)	Baseline (n=1,408)	Endline (n=1,411)	p- value
Age Mean (standard deviation)	31.0(7.7)	30.0(7.0)	31.9(8.1)	0.0000
Education				0.006
Higher	145(5.1)	83(5.9)	62(4.4)	
Secondary	1,088(38.6)	502(35.7)	586(41.5)	
Primary	1,203(42.7)	617(43.8)	586(41.5)	
No education	383(13.6)	206(14.6)	177(12.5)	
Exposure to the media				0.002
More exposure	829(29.4)	420(29.8)	409(29.0)	
Less exposure	1,266(44.9)	666(47.3)	600(42.5)	
No exposure	724(25.7)	322(22.9)	402(28.5)	
Religion				0.000
Catholic	748(26.5)	369(26.2)	379(26.9)	
Other Christian	1,855(65.8)	884(62.8)	971(68.8)	
Islam	187(6.6)	145(10.3)	42(3.0)	
Traditionalist	22(0.8)	8(0.6)	14(1.0)	
Others	6(0.2)	1(0.1)	5(0.4)	
Work status				0.080
Not working	613(21.8)	287(20.4)	326(23.1)	
Working	2,206(78.2)	1,121(79.6)	1,085(76.9)	
Marital status				0.000
Married	1,694(60.1)	926(65.8)	768(54.4)	
Living together	1,004(33.6)	447(31.7)	557(39.5)	
Formerly married	121(4.3)	35(2.5)	86(6.1)	
Age at marriage	20.7(4.5)	21.0(4.0)	20.4(4.9)	0.0003
Type of union				0.000
Monogamous	1,994(70.7)	1,109(78.8)	885(62.7)	
Polygynous	825(29.3)	299(21.2)	526(37.3)	
Number of children -mean (SD)	3.7(2.1)	3.7(2.1)	3.7(2.1)	0.6923
Local Government area				0.778
Esan South East	1,411(50.1)	701(49.8)	710(50.3)	
Etsako East	1,408(49.9)	707(50.2)	701(49.7)	

Note: All p-values were derived from chi-square test except for religion where Fisher's exact test was used because of cells with less than 5; and t-test for respondent's age, age at marriage, and number of children, and child's age.

Table 2: Distribution of the study population by the Outcome variables

Variable	Total N (%)	Baseline N (%)	Endline N (%)	Diff	p- value
Antenatal care (currently pregnant)					
Yes	300(66.7)	172(62.1)	128(74.0)	+11.9	0.009
No	150(33.3)	105(37.9)	45(26.0)		
Place of antenatal care (currently pregnant)					
Other	112(37.2)	82(47.4)	30(23.4)		0.000
PHC in the project community	189(62.8)	91(52.6)	98(76.6)	+24.0	
Antenatal Care (last birth)					
Yes	2,137(80.2)	972(74.0)	1,165(86.2)	+12.2	0.000
No	527(19.8)	341(26.0)	186(13.8)		
Place of antenatal care (last birth)					
Other	934(43.6)	577(59.2)	357(30.5)		0.000
PHC in the project community	1,210(56.4)	397(40.8)	813(69.5)	+28.7	
Place of delivery (last birth)					
Any facility	2,150(80.5)	988(75.2)	1,162(85.5)	+10.3	0.000
TBA/Home	522(19.5)	325(24.8)	197(14.5)		
Place of delivery (last birth)					
Other	1,453(54.4)	896(68.2)	557(41.0)		0.000
PHC in the project community	1,219(45.6)	417(31.8)	802(59.0)	+27.2	
Postnatal care					
Yes	2,297(86.0)	1,041(79.2)	1,256(92.5)	+13.3	0.000
No	375(14.0)	273(20.8)	102(7.5)		
Postnatal care (last birth)					
Other	999(43.3)	614(58.8)	385(30.5)		0.000
PHC in the project community	1,307(56.7)	431(41.2)	876(69.5)	+28.3	
Immunization					
Other facilities	780(30.7)	504(40.3)	276(21.4)		0.000
PHC in the project community	1,762(69.3)	748(59.7)	1,014(78.6)	+18.9	

Table 3: Odds of utilizing a PHC in the project communities for maternal and child health care

Variable	Place of antenatal care	Place of delivery	Place of postnatal Care	Immunization
<b>Survey</b>				
Baseline(RC)				
Endline	3.87(3.14-4.77)***	3.88(3.22-4.69)***	3.69(3.00-4.47)***	2.87(2.35-3.51)***
<b>Age</b>	0.96(0.94-0.98)***	0.97(0.95-0.99)**	0.96(0.94-0.98)***	0.98(0.96-1.00)
<b>Education</b>				
Higher(RC)				
Secondary	1.83(1.18-2.84)**	1.82(1.18-2.80)**	1.85(1.19-2.88)**	1.29(0.85-1.95)
Primary	2.45(1.54-3.90)***	2.16(1.37-3.39)**	2.48(1.56-3.95)***	1.48(0.96-2.30)
No education	2.75(1.60-4.72)***	1.59(0.96-2.64)	1.94(1.144-3.28)*	1.27(0.77-2.10)
<b>Exposure to the media</b>				
More (RC)				
Less	1.21(0.96-1.52)	1.14(0.92-1.40)	1.10(0.88-1.38)	1.18(0.94-1.47)
No exposure	1.15(0.86-1.52)	0.96(0.75-1.24)	0.91(0.69-1.18)	0.83(0.64-1.09)

<b>Religion</b>				
Catholic(RC)				
Other Christian	1.12(0.89-1.40)	1.14(0.93-1.40)	1.11(0.90-1.38)	1.21(0.98-1.49)
Islam/Others	2.10(1.37-3.22)**	1.68(1.16-2.43)**	1.44(0.98-2.11)	2.95(1.90-4.60)***
<b>Work status</b>				
Not working(RC)				
Working	0.97(0.76-1.24)	0.89(0.72-1.11)	0.78(0.62-0.99)*	0.78(0.61-0.99)*
<b>Marital status</b>				
Married(RC)				
Living together	0.86(0.69-1.08)	0.87(0.70-1.06)	0.79(0.64-0.99)*	0.69(0.56-0.85)**
Formerly married	0.43(0.25-0.73)**	0.48(0.29-0.77)**	0.50(0.30-0.84)**	0.43(0.27-0.69)***
<b>Age at marriage</b>	1.00(0.98-1.03)	1.00(0.97-1.02)	0.99(0.97-1.01)	0.97(0.94-0.99)*
<b>Type of union</b>				
Monogamous(RC)				
Polygynous	0.99(0.80-1.24)	0.96(0.79-1.17)	1.01(0.81-1.25)	0.83(0.67-1.03)
<b>Number of children</b>	1.11(1.04-1.18)**	1.08(1.02-1.15)**	1.14(1.06-1.21)***	1.09(1.02-1.16)**
<b>LGA</b>				
Esan South				
East(RC)	0.63(0.50-0.79)***	0.39(0.32-0.48)***	0.50(0.40-0.63)***	0.84(0.68-1.04)
Etsako East				

Note: \*\*\*p<0.001; \*\*p<0.01; \*p<0.05

Table 4. Reasons for use of PHC for delivery care (most recent birth)

S/N	Reason	Baseline N=2294	Endline N=3698	Diff Baseline minus Endline (%)
		N (%)	N (%)	
1	Cost not too much	386(16.8)	575(15.6)	-1.2
2	No charges	20(0.9)	26(0.7)	-0.2
3	Facility always open	236(10.3)	637(17.3)	+7.0
4	Providers are available	375(16.3)	674(18.3)	+2.0
5	Facility not far from my home	465(20.3)	443(12.0)	-8.3
6	Good quality service	451(19.7)	882(23.9)	+4.2
7	Husband wanted it	193(8.4)	361(9.8)	+1.4
8	Family wanted it	63(2.7)	60(1.6)	-1.1
9	Adequate security	43(1.9)	11(0.3)	-1.6
10	*Other (specify)	62(2.7)	20(0.5)	-2.2

\*At endline, other includes available facility, no reason, drugs available, and referred among others. Other at baseline includes baby's health/safety, no other facility among others.

Table 5. Reasons for non-use of PHC for delivery care (most recent birth)

S/N	Reason	Baseline N=532	Endline N=81	Diff Baseline minus Endline (%)
		N (%)	N (%)	
1	Cost too much	48(9.0)	9(11.1)	+2.1

2	Facility not open	46(8.6)	15(18.5)	-9.9
3	No provider in the facility	64(12.0)	5(6.2)	-5.8
4	Facility too far	62(11.7)	7(8.6)	-3.1
5	No transport to facility	21(3.9)	3(3.7)	-0.2
6	Poor quality service	104(19.5)	6(7.4)	-12.1
7	Husband did not allow	27(5.1)	7(8.6)	+3.5
8	Family did not allow	9(1.7)	3(3.7)	+2.0
9	No time baby came suddenly	33(6.3)	8(9.9)	+3.6
10	My culture forbids	5(0.9)	0(0.0)	-0.9
11	No security	2(0.4)	1(1.2)	+0.8
12	*Other (Specify)	111(20.9)	17(21.0)	+0.1

\*Other at endline include preference for private hospital or home delivery, no money, not sick. Other at baseline include no PHC facility, choice, had complications, dislike PHC, referred from PHC, among others.