

# The positive effect of job aids on Patent and Proprietary Medicine Vendor injectable contraceptive knowledge 9 months after training: Longitudinal results from implementation science research in Nigeria

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## Research article

### Keywords:

**Posted Date:** July 10th, 2019

**DOI:** <https://doi.org/10.21203/rs.2.11179/v1>

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**Version of Record:** A version of this preprint was published on October 24th, 2019. See the published version at <https://doi.org/10.1186/s12889-019-7668-2>.

# Abstract

**Background** To increase access to voluntary family planning services, policymakers in Nigeria are debating how to task share the provision of injectable contraceptives to drug shop owners known as Patent and Proprietary Medicine Vendors (PPMVs). Globally, task sharing family planning services to drug shops has been identified as a promising practice, but more evidence is needed on how to support PPMVs in providing family planning, such as injectable services, if policy were changed. **Methods** Data were collected from 194 PPMVs in Bauchi, Cross River, Ebonyi and Kaduna states at three time points. PPMVs were trained to provide family planning counseling and injectable contraceptive services, including administration. PPMVs were interviewed immediately before, immediately after, and 9 months after the training. Three outcome variables were used to represent knowledge of injectable contraceptives: intramuscular deo-medroxyprogesterone acetate (DMPA) knowledge, subcutaneous DMPA knowledge, and knowledge of 4 or more of 7 common side effects of progestin-only injectables. Unadjusted and adjusted logistic regression models were conducted for each outcome variable to determine which factors affect PPMV knowledge of injectable contraceptives 9 months after the training. **Results** PPMVs' intramuscular and subcutaneous DMPA knowledge and side effect knowledge was low before the training and then increased immediately afterwards. Nine months following the training, intramuscular and subcutaneous DMPA knowledge decreased and side effect knowledge remained relatively the same compared to the post-training results. Results from three logistic regression models found that PPMVs who reported using at least 2 of the 3 family planning job aids provided during the training had significantly higher knowledge compared to those who reported using one or no job aids. **Conclusion** Providing PPMVs with family planning job aids as part of a larger capacity-building strategy should be considered as they may help PPMVs retain knowledge after training. These results contribute to the literature on task sharing family planning services to private sector drug shops and implications for scale-up.

## Background

Approximately 28% of married (or in-union) women of reproductive age in Nigeria have an unmet need for family planning- 19% for spacing pregnancies and 9% for limiting [1]. In 2016, few married women (11%) used a modern contraceptive [1]. This is a one percentage point increase in Nigeria's modern contraceptive prevalence rate from the 2013 National Demographic and Health Survey [2]. While there is no difference in the unmet need for family planning between urban (27.5%) and rural (27.7%) residents, more women in urban areas (18%) reported using a modern method compared to only 8% of women in rural areas [1].

Among the 11% of married or in-union women who are using modern contraceptives, 40% choose the injectable, 21% choose the pill, 13% choose the implant, 11% choose condoms, and 15% use various other methods [1]. Among modern contraceptive users, 60% obtain their method from the private sector compared to 29% who seek services from the public sector [2]. Of both public and private sources, 38% of

modern contraceptive users obtain their last method from a Patent and Proprietary Medicine Vendor (PPMV)- 52% of pill users, 13% of injectable users and 38% of condom users [2].

### *Efforts to increase access to family planning services in Nigeria*

Nigeria's Federal Ministry of Health (FMOH) is dedicated to improving access to voluntary family planning services for all women and couples across the country. During the 2012 Family Planning Summit, the FMOH committed to working with the private sector and global partners to reach a modern contraceptive prevalence rate of 27% by 2020 [3]. In 2017, the FMOH further committed to "expanding the implementation of its task-shifting policy to include PPMVs and community resource persons to improve access to family planning services in difficult-to-reach areas and among disadvantaged populations" [3]. Due to PPMVs' popularity with family planning clients, especially young and unmarried women [4], and the popularity of the injectable method, the Government in Nigeria has been exploring task sharing injectable contraceptive services to PPMVs.

### *Task sharing voluntary family planning services to drug shops*

The World Health Organization defines task sharing as the process of delegation or distribution of tasks or services among workforce teams, and where appropriate, tasks are shared from highly skilled health workers to healthcare workers with fewer qualifications[5]. While task sharing the provision of oral and injectable contraceptives to community health workers has been proven safe [6, 7] and become common, many countries restrict private sectors providers such as pharmacies and drug shops from providing these services even though they typically have the same (drug shops owners) or higher (pharmacists) qualifications as community health workers [8]. Task sharing the provision of family planning services to drug shops and pharmacies has been identified as a promising high-impact practice to expand access to contraceptive services [9]. Studies in Uganda [10] and Bangladesh [9] have also shown that drug shops can safely administer injectable contraceptives and clients find these services acceptable. Uganda has begun task sharing injectable contraceptive services to drug shops [11].

### *The role of Patent and Proprietary Medicine Vendors and family planning in Nigeria*

PPMVs are comparable to drug shop owners in other countries. They are licensed by State Ministries of Health to sell over the counter, pre-packaged medications [12] but are prohibited from prescribing medications or performing invasive procedures such as in injections [13]. There are no educational or training requirements for PPMV licensure [14] and the perception in Nigeria is that PPMVs have limited education. Many studies have found, however, that the majority of PPMVs have attained a secondary education or higher [15, 16, 17, 18].

In a systematic review of PPMVs in health care provision, Beyeler et al. [17] found that in addition to family planning, PPMVs are an important source of care for many Nigerians including up to 55% of under-five child illnesses. PPMVs are a popular source of care because they are located throughout rural and urban Nigeria with approximately 24 shops per 100 000 population [14]. In addition to their

prevalence, they are a popular because of their: (a) consistent drug stocks; (b) convenient hours of operation; (c) personable interactions; (d) lack of separate fees for consultations; and (e) anonymous care [19, 20, 21].

Previous studies in Nigeria have found mixed results related to PPMVs' ability to provide injectable contraceptives. Ajuwon et al. [16] found that PPMV knowledge was low but that clients were satisfied with the services received. One study in six states in Nigeria found that PPMVs had higher knowledge of injectable contraceptives with training [15, 19]. These results are consistent with similar interventions conducted with drug shops in Uganda [22].

### *Job aids to assist Patent and Proprietary Medicine Vendor provision of injectable contraceptives*

Evidence is needed on how to support PPMVs in Nigeria (and drug shops in other countries) to provide injectable contraceptive services if policy were changed. One strategy includes providing PPMVs with job aids in addition to training and monitoring. Job aids provide healthcare workers with procedural, informational or decisional "need-to-know" information in a simplified manner [23]. Job aids include posters, cue cards, and algorithms, among other tools. They help address issues such as provider forgetfulness and time constraints [23]. In Uganda and the Democratic Republic of Congo, Tumlinson et al. [24] found that family planning job aids were used by about half of the providers surveyed between 7 and 24 months after training. Those who used the job aids found them to be "very useful." A study in South Africa found that job aids assisted providers in excluding pregnancy for late-arriving deo-medroxyprogesterone acetate (DMPA) clients and thereby addressed unintentional discontinuation among those clients [25]. They found no difference in clients' timeliness for reinjections, however.

## **Methods**

To contribute to the current policy discussions in Nigeria and in similar settings, this paper looks at whether job aids affect PPMV knowledge of injectable contraceptives nine months after receiving a standardized training. Data were collected under a larger implementation research study conducted between 2015 and 2018 that looked at the feasibility and acceptability of PPMV provision of progestin-only injectable contraceptives. Specifically, the data came from surveys conducted with PPMVs in four states in Nigeria- Bauchi, Cross River, Ebonyi and Kaduna. In each state, four local government areas (two urban and two rural) were randomly selected for a total of 16. The regulatory body for PPMVs in Nigeria, the Pharmacy Council of Nigeria (PCN), recruited PPMVs for the study based on the following criteria: (a) licensure with PCN; (b) interest and willingness to participate; (c) ability to read and write in English; and (d) commitment to attend all the training sessions. In states where PCN licensure was low, the National Association of Patent and Proprietary Medicine Vendors assisted with recruitment. A final sample of 229 PPMVs were randomly selected from the short list of candidates identified by PCN and the National Association of Patent and Proprietary Medicine Vendors.

### *Intervention*

Between May and June of 2017, the 229 PPMVs were trained in family planning counseling and the provision of progestin-only injectable contraceptives (counseling, sale, referral and administration). The training was facilitated by two family planning trainers certified in Nigeria and lasted five days. The curriculum was based on validated materials developed by PATH [26] and FHI 360 [27] and covered the following topics: (a) family planning counseling; (b) injectable client screening and counseling; (c) intramuscular and sub-cutaneous administration of injectable contraceptives (including the re-injection grace period); (d) commodity storage; (e) sharps disposal; (f) infection prevention practices; and (g) pharmacovigilance.

During the training, each PPMV was given three job aids: (a) the Contraceptive Medical Eligibility Criteria (MEC) wheel; (b) Balanced Counseling Strategy Plus (BCS+) cards; and (c) a DMPA screening check list. The MEC wheel provides information on which contraceptive methods are safe for women based on their health characteristics [28]. BCS+ cards assist health care workers in providing clients with targeted and quality family planning counseling [29]. The DMPA screening checklist assists providers to screen injectable contraceptive clients based on their medical eligibility [27].

At the end of the training, PPMVs were required to demonstrate competence in administering intramuscular and sub-cutaneous forms of DMPA (DMPA-IM and DMPA-SC) on dummy models before continuing with the study. The trainers used a standard observation checklist to determine competency. Four PPMVs were excluded from the study because they were unable to demonstrate competency which brought the final sample for the study to 225.

After the training, a monitoring team comprised of the research team, trainers, and federal, state, and local Ministry of Health representatives visited PPMVs one- and six-months after the training to identify knowledge gaps and challenges, and to offer feedback to PPMVs. PPMV-client interactions were not observed during these visits and PPMVs were informed when the monitoring visit would take place.

### *Data collection*

Eight data collectors administered three interviews to PPMVs- a pre-test interview immediately before the training, a posttest interview immediately after the training, and a 9-month follow-up interview. The data collectors were trained in research ethics, the study's design and the questionnaires approximately two weeks before the training and pre-test interview. Informed consent was received before the beginning of the training and pre-test interview, and before the start of the 9-month follow-up interview. All three tools included identical knowledge questions on injectable contraceptives (e.g. frequency and administration location, counseling on side effects, and eligibility criteria). The pre-test interview also included questions on PPMV characteristics and their experience providing injectable contraceptives. The 9-month interview included questions on PPMV provision of injectable contraceptives and family planning services, and their experience with the intervention (training, job aids and monitoring visits).

### *Data Analysis*

The sample was restricted to PPMVs who completed all three interviews. Of the 225 PPMVs enrolled in the study, 31 PPMVs were unavailable at the time of the 9-month interview, bringing the sample to 194. Pearson chi-square tests were used to determine whether the sample used for this analysis (n=194) had similar background characteristics to the overall sample from the study (n=225). The results of this sensitivity analysis suggested that the two groups were not statistically different (p-value  $\leq 0.05$ ).

Three outcome variables were used to represent PPMV knowledge of progestin-only injectable contraceptives: (1) DMPA-IM knowledge; (2) DMPA-SC knowledge; and (3) progestin-only injectable side effect knowledge. The DMPA-IM variable was created by combining three knowledge questions: (a) the type of device used to administer DMPA-IM; (b) where DMPA-IM can be administered on the body; and (c) the reinjection frequency. The variable was dichotomized and coded as 1 if the PPMV answered all aspects of each question correctly, and 0 if the PPMV answered any part of the three questions incorrectly. The DMPA-SC variable was also dichotomized and was based on the same three questions that were specific to DMPA-SC. The variable was coded as 1 if the PPMV answered all aspects of each question correctly, and 0 if the PPMV answered any part of the three questions incorrectly.

The side effect variable was based on PPMVs unprompted response to the question “what are the common side effects of progestin-only injectable contraceptives.” The variable was dichotomized and coded 1 if the PPMV could name at least 4 of the 7 common side effects of progestin only injectables (change in menstruation, headaches, dizziness, weight gain, mild skin irritation, decrease in sex drive, and delayed return to fertility) and 0 if the PPMV identified 0-3 of those side effects. A cut-off of 4 was used based on the distribution of side effects PPMVs correctly identified at the post-test interview.

Descriptive statistics were calculated for PPMV characteristics. Pearson chi-square tests were conducted to assess associations between the three interviews to assess trends in knowledge over time. Significance was determined using a probability value of 0.05 or less. To determine factors associated with higher knowledge at the 9-month interview, three logistic regression models were conducted, one for each of the outcome variables. Unadjusted odds ratios were first calculated to assess whether certain PPMV characteristics predicted the likelihood of DMPA-IM, DMPA-SC, and side effect knowledge.

The main predictor variable was PPMVs’ use of job aids. At the 9-month interview, PPMVs were asked whether they used the jobs aids distributed during the training when providing family planning services to their clients. Those who reported using job aids were then asked which job aids they used. The predictor variable was coded as a categorical variable with the following categories: (1) those who used 0 or 1 of the job aids; (2) those who used 2; and (3) those who used all 3 job aids. Because few PPMVs reported using no job aids (n=26), this category was grouped with those who used only 1 job aid.

Adjusted odd ratios were calculated with the main predictor variable and the following covariates: (a) sex; (b) age; (c) education; (d) marital status; (e) state; and (f) administering an injectable in the past 30-days. Age was dichotomized around the median age of 35 and the variable was coded 1 if the PPMV was 35 or older and 0 if 34 or younger. Education was dichotomized so that those who had at least two years of post-secondary education were coded as 1 and those who had completed a primary or secondary

education were coded as 0 (all the participants had a least a primary education). Marital status was dichotomized where those who were currently married were coded as 1 and those who were single, divorced or widowed were coded as 0. State was a categorical variable with a category for each of the four participating states.

The variable for administering an injectable contraceptive in the past 30 days varied by model. For the DMPA-IM outcome, a dichotomized variable for administering DMPA-IM to a client was used; for the DMPA-SC outcome, a dichotomized variable for administering DMPA-SC was used; and for the side effect outcome, administering any type of progestin-only injectable was used. These variables were coded as 1 if the PPMV reported administering the injectable to at least one client in the past 30 days and 0 if they did not administer an injectable in that timeframe.

Other variables considered due to theoretical importance were previous health facility experience and receiving a monitoring visit by the study team. Previous health facility experience was not included in the model because it was not a statistically significant predictor of any of the outcome variables at the post-test or 9-month interview in the bivariate analyses. Monitoring visits were also excluded from the models because almost all PPMVs received the 6-month monitoring visit.

## Results

### *Patent and Proprietary Medicine Vendor characteristics*

**Table 1** presents characteristics of the 194 PPMVs at the time of the pre-test survey. The majority of PPMVs were male (76%) and were married (72%). More than half (55%) were 35 or older and 57% had completed more than a secondary education. Few PPMVs (6%) had completed only a primary education (data not shown). Twenty-nine percent reported ever working in a health facility and 44% reported they had administered an injectable contraceptive to a client in their shop before the pre-test interview and training.

**Table 2** presents self-reported injectable contraceptive services provided and use of job aids at the 9-month interview. Sixty-seven percent of PPMVs reported they had administered a progestin-only injectable contraceptive to at least one client in the 30 days preceding the interview. More PPMVs reported administering DMPA-IM (56%) compared to DMPA-SC (23%). The mean number of injectable contraceptives administered in the 30 days preceding the 9-month interview was 3 (1.5 for DMPA-IM and 0.5 for DMPA-SC, data not shown).

PPMVVs were asked whether they used job aids while providing family planning services during the 9 months since the training. Most PPMVs (87%) reported using at least one of the three family planning job aids provided as part of the intervention: 27% of PPMVs reported using all three, 30% used two, and 43% used either one or none (13% did not report using a job aid). Of the three job aids provided, 68% of PPMVs reported using the MEC wheel, 61% used the BCS+ counseling cards, and 40% reported using the DMPA screening checklist (data not shown).

### *PPMV trends in knowledge from the three interviews*

**Figure 1** presents trends in PPMV knowledge on the three outcome variables from the pre-test, posttest and 9-month interviews. DMPA-IM and DMPA-SC knowledge (administration device, where the injectable can be administered on the body, and reinjection frequency) were low at the pre-test interview and then increased substantially by the post-test interview. For example, the proportion of PPMVs with DMPA-IM knowledge increased from 12% at pre-test to 86% at post-test interviews ( $p\text{-value} \leq 0.01$ ). Between the posttest and 9-month interview, however, the proportion who had DMPA-IM knowledge decreased from 86% to 62% ( $p\text{-value} \leq 0.01$ ). A similar trend was observed for DMPA-SC knowledge. Knowledge of these two indicators at the 9-month interview was still significantly higher than knowledge at the pre-test interview ( $p\text{-value} \leq 0.01$ ).

PPMV knowledge of side effects increased from the pre-test to posttest interview and continued to increase after the training. The proportion of PPMVs who could name at least 4 of the 7 common side effects increased from 3% at the pre-test interview to 47% at the post-test interview ( $p\text{-value} \leq 0.01$ ). The proportion of PPMVs who had side effect knowledge increased to 56% at the 9-month interview but this difference was not statistically significant from the posttest interview ( $p\text{-value} \leq 0.05$ ).

### *Effect of reported use of job aids on DMPA-IM and DMPA-SC knowledge*

Logistic regression models were conducted to understand what factors predicted the likelihood of DMPA-IM and DMPA-SC knowledge at the 9-month interview. **Table 3** shows the unadjusted and adjusted odds ratios of DMPA-IM knowledge at the 9-month interview. Use of job aids was the only significant predictor of DMPA-IM knowledge at the 9-month interview. Without adjusting for covariates, PPMVs who reported using two job aids were 2.3 times more likely than those who used only one or no job aids (95% CI 1.12 - 4.60). Those who used all three job aids were 3.7 times more likely compared to those who used only 1 or no job aids (95% CI 1.68 - 8.24).

When adjusting for sex, age, education, marital status, administration of DMPA-IM in the past 30 days and state, use of jobs aids remained a significant predictor of DMPA-IM knowledge. Those who used two job aids remained 2.3 more likely to have DMPA-IM knowledge (95% CI 1.08 - 4.72) compared to those who used one or no job aids. Those who used three job aids were 3.4 times more likely to have DMPA-IM knowledge (95% CI 1.43 - 8.14). Use of three jobs aids was not associated with a higher likelihood of DMPA-IM knowledge when compared to those who used two jobs aids (AOR: 1.51 95% CI: 0.61 - 3.73, data not shown). While having post-secondary education and administration of DMPA-IM in the past 30 days were negative predictors of DMPA-IM knowledge, these findings were not significant, and the odds ratios were close to 1.

**Table 4** shows the unadjusted and adjusted odds ratios for DMPA-SC knowledge. These results are similar to those for DMPA-IM. Before adjusting for covariates, those who used two job aids were 2.5 times more likely to have knowledge of DMPA-SC at the 9-month interview than those who used one or no job aids (95% CI 1.2 - 4.9). Those who used three job aids were also 2.5 times more likely to have DMPA-SC

knowledge compared to those who used one or no job aids (95% CI 1.2 - 5.1). When adjusting for covariates, use of two and use of three job aids remained significant predictors of DMPA-SC knowledge. Those who used two job aids were 2.6 times more likely than those who used one or no job aids (95% CI 1.3 - 5.5), and PPMVs who used three job aids were 2.3 times more likely to have DMPA-SC knowledge (95% CI 1.1 - 5.1). Similar to the DMPA-IM model, use of three jobs aids was not associated with a higher likelihood of DMPA-SC knowledge when compared to those who used two jobs aids (AOR: 0.9 95% CI: 0.40 - 2.10, data not shown).

State was a significant predictor of DMPA-SC knowledge in the unadjusted model. PPMVs in Cross River were 2.4 times more likely to have DMPA-SC knowledge compared to those in Bauchi (95% CI 1.0 - 5.4). State was not a significant predictor of DMPA-SC knowledge in the adjusted model, however. Administering DMPA-SC to a client in the past 30 days, having more than a secondary education, sex, age, and marital status were not significant predictors of DMPA-SC knowledge in the unadjusted or adjusted models.

#### *Effect of reported use of job aids on knowledge of 4 or more common side effects*

**Table 5** shows the unadjusted and adjusted odds ratios for PPMV knowledge of 4 or more of the 7 common side effects of injectables contraceptives. Before adjusting for covariates, PPMVs who used two job aids were 2.6 times more likely than those who used one or no job aids to have knowledge of 4 or more common side effects (95% CI 1.3 - 5.1). When adjusting for covariates, use of two jobs aids remained significant. Those who reported using two job aids were 2.7 times more likely to have side effect knowledge than those who only used one or no job aids (95% CI 1.3 – 5.7). Use of three job aids was not significant in the unadjusted or adjusted models. PPMVs with more than a secondary education were 1.8 times more likely than those with a primary or secondary education in the unadjusted model. The effect of education, however, was attenuated in the adjusted model.

## **Discussion**

Results from this study suggest that job aids, when provided as part of a larger task sharing intervention, help PPMVs retain key injectable contraceptive knowledge after training. The pre-test interview results are consistent with previous studies that found that without training, drug shop operators generally have low injectable contraceptive knowledge [16, 22]. Despite low knowledge before the training, almost half of PPMVs reported they had previously administered injectable contraceptives to clients, similar to drug shop operators in Uganda [22]. This suggests that many PPMVs are providing injectable contraceptive services to meet client demand but without the necessary knowledge to do so. For PPMVs to provide injectable contraceptives, they first need accurate and up-to-date information. Knowledge outcomes increased from the pre-test interview to the posttest interview, suggesting that PPMVs can learn from a standard training based on learning materials that have been previously tested. Since the education levels of PPMVs varied, basing curricula on materials geared toward community health volunteers is suggested with interventions with PPMVs and drug shops in similar settings.

Nine months after the training, however, knowledge on the key DMPA-IM and DMPA-SC indicators decreased and side effect knowledge remained relatively low. This indicates that training alone is not enough to ensure PPMVs retain the necessary knowledge to provide injectable contraceptives. Including job aids as part of a capacity-building strategy may help ensure knowledge remains high over time. PPMVs who reported using at least two of the three job aids when providing family planning services were more likely to have knowledge of DMPA-IM, DMPA-SC, and side effects of progestin-only injectables nine months after the training. Job aids, when used, have been shown to be an effective tool to help health care providers adhere to service protocols and remember key information [23, 24, 25]. Results from this study suggest that drug shop operators can also benefit from using job aids, especially when implemented as part of a larger intervention as found in previous studies[23]. As with the curriculum, using job aids that have been previously tested is suggested in similar interventions with PPMVs or with drug shops in other settings.

Provision of an injectable method in the previous 30 days was not found to be a statistically significant predictor of knowledge for any of the three outcomes. This may be because the average number of clients seen by PPMVs (3 clients) was low. This intervention did not incorporate any demand generation activities. Future studies and programs should consider including activities to raise women's awareness of task shared services. Additional research is needed on whether higher client load results in better knowledge outcomes after training. Finally, a majority of the PPMVs were monitored one and six months after the training. Despite this support, fewer PPMVs had injectable contraceptive knowledge by the nine-month survey. Further research is needed on the frequency of supportive supervision and appropriate supervision tools required for PPMVs to provide injectable contraceptives at scale.

### *Limitations*

The variable "use of job aids" was self-reported rather than observed. While there is a chance that PPMVs over-reported their use of job aids during the 9-month interview, there was no direct benefit to PPMVs for using job aids as part of the intervention. This reduced the chance for any significant overreporting.

Client-provider observations were not conducted as part of this study due to the lack of sufficient demand and logistical constraints. For this reason, knowledge outcomes were used instead of behavioral ones. Although knowledge is not a proxy for behavior, based on Issenberg's 2005 elements for analyzing professional competence, knowledge is the first domain of competence and therefore required before performance in control or real-life settings [30].

### **Conclusion**

The FMOH, like many governments in West Africa, will need to employ a multi-sector approach to expand access to family planning services for its rapidly growing population. Results from this and previous studies have shown that drug shop operators, such as PPMVs, are already providing injectable contraceptives but require support to have the necessary knowledge and skills to provide injectables properly. With comprehensive support, PPMVs have the potential to be a viable source for injectable

contraceptive services for women in Nigeria. Training is a necessary first step but is not enough to ensure knowledge over time. Job aids can assist PPMVs, and other newly trained family planning providers, in remembering key details, especially long lists of information such as side effects. Monitoring and supervision are also important aspects to ensure safe and quality services from PPMVs. These results contribute to the existing literature showing that task sharing family planning services to drug shops is a feasible practice to help governments expand access to voluntary family planning services that meet clients' needs.

## Abbreviations

**BCS+** Balanced Counseling Strategy Plus

**DMPA** Deo-medroxyprogesterone acetate

**FMOH** Federal Ministry of Health

**IM** Intramuscular

**MEC** Medical Eligibility Criteria

**PCN** Pharmacy Council of Nigeria

**PPMV** Patent and Proprietary Medicine Vendor

**SC** Sub-cutaneous

## Declarations

### *Ethics approval and consent to participate*

The research protocol received ethical approval from the Population Council's Institutional Review Board, Nigeria's National Health Research Ethic Committee, and ethic committees based at state ministries of health in Bauchi, Cross River, Ebonyi and Kaduna. Informed consent was received before the beginning of the training and pre-test interview, and before the start of the 9-month follow-up interview

### *Consent for publication*

Not applicable.

### *Availability of data and materials*

The datasets generated and analyzed during the current study will be available in the United States Agency for International Development, Development Data Library repository in January 2021.

### *Competing interests*

The authors declare that they have no competing interests.

## ***Funding***

The Evidence Project is made possible by the generous support of the American people through the United States Agency for International Development under the terms of cooperative agreement no. AID-OAA-A-13-00087. The contents of this manuscript are the sole responsibility of the Evidence Project and Population Council and do not necessarily reflect the views of USAID or the United States Government.

## ***Author's contributions***

SCD contributed to the formal analysis, original manuscript preparation, project administration and data curation. SI and AJ contributed to the conceptualization, methodology, and supervision of the overall study, and AJ contributed to the supervision of the formal analysis. FO, CA, and AA contributed to the project administration, study's investigation and data curation. All authors contributed to the review and editing of the manuscript.

## ***Acknowledgements***

The study was conducted in collaboration with the Federal Ministry of Health of Nigeria and State Ministries of Health in Bauchi, Cross River, Ebonyi and Kaduna.

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## Tables

**Table 1: PPMV characteristics at the pre-test interview (N=194)**

	%	n
Sex		
Male	75.8	147
Female	24.3	47
Age		
17-34	45.4	88
35+	54.6	106
Marital status		
Single/separated/divorced/widowed	27.8	54
Married/in-union	72.2	100
Highest education level achieved		
Primary-secondary education	43.3	84
Two+ years of post-secondary education	56.7	110
Has ever worked in a health facility		
Yes	28.9	56
No	71.1	138
Had ever administered an injectable contraceptive to client in their shop		
Yes	43.8	85
No	56.2	109
State		
Bauchi	27.3	53
Cross River	23.2	45
Ebonyi	26.8	52
Kaduna	22.7	44

**Table 2: Reported services provided by PPMVs at the 9-month interview (N=194)**

	%
Had administered any progestin-only injectable to a client in the past 30 days	67.0
Had administered DMPA-IM to a client in the previous 30 days	55.7
Had administered DMPA-SC to a client in the previous 30 days	23.2
Reported using job aids†	
0-1 job aids	42.8
2 job aids	29.9
3 job aids	26.3
† 2 missing observations	

**Table 3: Unadjusted and adjusted odds ratios of DMPA-IM knowledge at 9-month interview (N=194)**

	Unadjusted odds		Adjusted oddst	
	Odds ratio	95% CI	Odds ratio	95% CI
Number of job aids used when providing FP counseling†				
Used 0 or 1	ref	-	-	-
Used 2	2.28*	(1.12 - 4.60)	2.26*	(1.08 - 4.72)
Used 3	3.73**	(1.68 - 8.24)	3.41**	(1.43 - 8.14)
Sex				
Female	ref	-	-	-
Male	0.86	(0.44 - 1.66)	0.89	(0.41 - 1.92)
Age				
34 or younger	ref.	-	-	-
35 or older	1.18	(0.66 - 2.12)	1.16	(0.58 - 2.34)
Had 2 or more years of higher education				
No	ref	-	-	-
Yes	0.72	(0.40 - 1.31)	0.89	(0.41 - 1.91)
Marital status				
Not married	ref	-	-	-
Currently married	1.08	(0.56 - 2.05)	0.98	(0.44 - 2.18)
Injected DMPA-IM in the past 30 days				
No	ref	-	-	-
Yes	1.41	(0.92 - 2.16)	0.99	(0.51 - 1.90)
State				
Bauchi	ref	-	-	-
Cross River	1.75	(0.66 - 3.24)	1.16	(0.41 - 3.27)
Ebonyi	1.46	(0.34 - 1.74)	1.11	(0.44 - 2.83)
Kaduna	0.78	(0.82 - 2.43)	0.76	(0.30 - 1.91)

† 2 missing observations

\* p-value  $\leq$  0.05; \*\* p-value  $\leq$  0.01

**Table 4: Unadjusted and adjusted odds ratios of DMPA-SC knowledge at 9-month interview (N=194)**

	Unadjusted odds		Adjusted oddst	
	Odds ratio	95% CI	Odds ratio	95% CI
Number of job aids used when providing FP counseling†				
Used 0 or 1	ref	-	-	-
Used 2	2.48*	(1.24 - 4.93)	2.55*	(1.23 - 5.27)
Used 3	2.47*	(1.20 - 5.08)	2.34*	(1.07 - 5.13)
Sex				
Female	ref	-	-	-
Male	1.92	(0.97 - 3.77)	1.83	(0.84 - 3.99)
Age				
34 or younger	ref	-	-	-
35 or older	0.78	(0.44 - 1.38)	0.94	(0.47 - 1.87)
Had 2 or more years of higher education				
No	ref	-	-	-
Yes	1.14	(0.64 - 2.01)	1.45	(0.68 - 3.09)
Marital status				
Not married	ref	-	-	-
Currently married	0.69	(0.36 - 1.31)	0.62	(0.27 - 1.39)
Injected DMPA-SC in the past 30 days				
No	ref	-	-	-
Yes	1.74	(0.88 - 3.44)	1.84	(0.85 - 3.98)
State				
Bauchi	ref	-	-	-
Cross River	2.36*	(1.04 - 5.35)	1.66	(0.60 - 4.61)
Ebonyi	1.16	(0.54 - 2.51)	1.21	(0.48 - 3.05)
Kaduna	1.57	(0.70 - 3.50)	1.29	(0.52 - 3.24)

† 2 missing observations

\* p-value  $\leq$  0.05; \*\* p-value  $\leq$  0.01

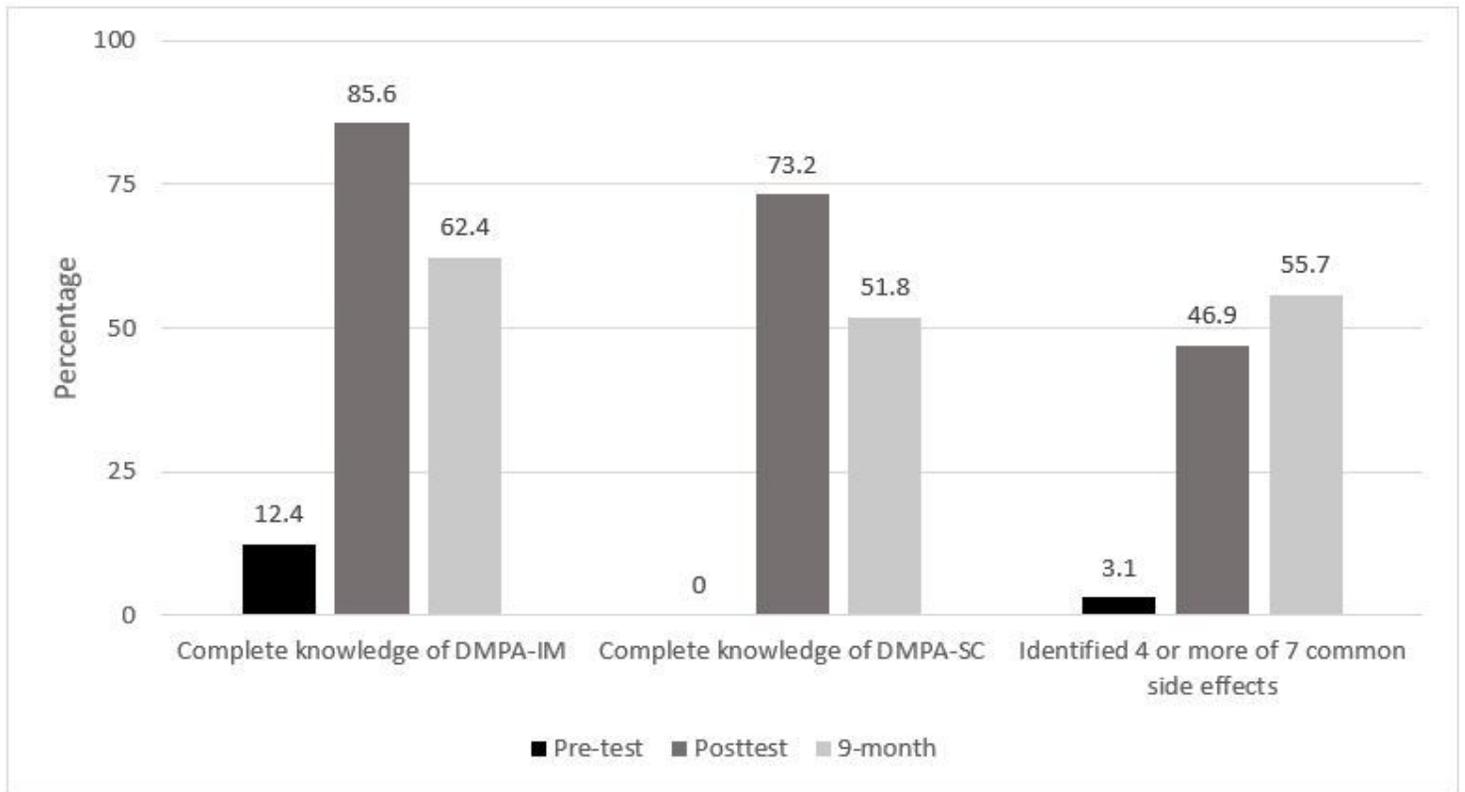
**Table 5: Unadjusted and adjusted odds ratios for knowledge of 4 or more side effects at 9-month interview (N=194)**

	Unadjusted odds		Adjusted oddst	
	Odds ratio	95% CI	Odds ratio	95% CI
Number of job aids used when providing FP counseling†				
Used 0 or 1	ref	-	-	-
Used 2	2.55**	(1.27 - 5.13)	2.71**	(1.28 - 5.73)
Used 3	1.78	(0.88 - 3.60)	2.23	(0.99 - 5.03)
Sex				
Female	ref	-	-	-
Male	1.23	(0.63 - 2.40)	1.32	(0.62 - 2.83)
Age				
34 or younger	ref	-	-	-
35 or older	0.84	(0.48 - 1.49)	0.84	(0.43 - 1.65)
Had 2 or more years of higher education				
No	ref	-	-	-
Yes	1.78*	(1.00 - 3.17)	1.33	(0.65 - 2.73)
Marital status				
Not married	ref	-	-	-
Currently married	1.12	(0.59 - 2.10)	1.05	(0.49 - 2.28)
Injected any injectable contraceptive in the past 30 days				
No	ref	-	-	-
Yes	1.28	(0.70 - 2.34)	0.88	(0.44 - 1.79)
State				
Bauchi	ref	-	-	-
Cross River	0.75	(0.34 - 1.68)	0.73	(0.27 - 1.96)
Ebonyi	0.56	(0.26 - 1.22)	0.62	(0.25 - 1.55)
Kaduna	1.15	(0.50 - 2.62)	1.17	(0.46 - 2.96)

† 2 missing observations

\* p-value  $\leq$  0.05; \*\* p-value  $\leq$  0.01

# Figures



**Figure 1**

PPMV knowledge of DMPA-IM and DMPA-SC characteristics, and of 4 or more side effects at pre-test, posttest and 9-month follow-up interviews (N=194)