RESEARCH ARTICLE

Accessing DMPA-SC through the public and private sectors in Nigeria: users’ characteristics and their experiences [version 1; peer review: 1 approved, 1 approved with reservations]

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Abstract

Background: Beginning in 2015, subcutaneous depot medroxyprogesterone acetate (DMPA-SC) was added to the contraceptive method mix in Nigeria, primarily through social marketing in the private sector and community-based distribution in the public sector. We compare user experiences in acquiring DMPA-SC across sectors during this national scale-up.

Methods: From October 2017 to February 2018, 459 women (N_public=235; N_private=224) completed a phone survey from a convenience sample of 1,444 women (N_public=912; N_private=532) who obtained DMPA-SC from participating providers and agreed to be contacted. We examined the sociodemographic predictors of attending a public vs. private provider and analyzed differences in care-seeking across sectors (becoming aware of DMPA-SC, choosing a provider, choosing DMPA-SC, quality of care).

Results: Respondents obtaining DMPA-SC from public providers were younger and less educated than those attending private providers. Both program respondents were comprised of similar percentages of new users of modern contraception (58.7-60.3%), although most respondents became aware of DMPA-SC through a friend/family member (43.1%) or a provider (41.5%). Relatively more public sector respondents also heard about DMPA-SC through community outreaches whereas relatively more private sector respondents became aware through media. Convenience was the most common reason for choosing a provider—43.8% among all respondents (higher among public sector respondents). Private sector respondents were also more likely to choose a past or usual provider. Having overall higher quality interactions were more likely among clients who attended private providers than public providers, but responses to individual quality item measures show specific areas of poor quality for
providers in each sector.

**Conclusions:** Training emphasizing technical thoroughness, sensitivity toward younger women, and client choice may help improve women’s experiences with obtaining DMPA-SC, ultimately contributing to accelerating demand for and uptake of DMPA-SC specifically and contraception in general.

**Keywords**
Injectable contraceptive, subcutaneous depot medroxyprogesterone acetate, Nigeria, social marketing, private sector, public sector, community based distribution

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**Author roles:** Liu J: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; Shen J: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Resources, Software, Visualization, Writing – Review & Editing; Schatzkin E: Data Curation, Investigation, Methodology, Resources, Writing – Review & Editing; Adedeji O: Conceptualization, Validation, Writing – Review & Editing; Kongnyuy E: Validation, Writing – Review & Editing; Onuoha C: Conceptualization, Investigation, Resources, Validation, Writing – Review & Editing; Fajemisin M: Validation, Writing – Review & Editing; Ayodeji K: Data Curation, Investigation, Software, Writing – Review & Editing; Omoluabi E: Data Curation, Investigation, Methodology, Project Administration, Resources, Supervision, Writing – Review & Editing

**Competing interests:** Authors from the University of California, San Francisco (JL, JS, ES) and Akena Associates (KA, EO) declare no conflicts of interest. OA and EK are employees of the United Nations Population Fund. UNFPA works in partnership with the Government of Nigeria to implement activities that provide universal access to sexual and reproductive health, promote reproductive rights, reduce maternal mortality, and accelerate progress toward achieving ICPD declarations. UNFPA provided funds to implement the public sector DMPA-SC program in Nigeria described in this article. CO and MF are employees of DKT Nigeria, a non-profit organization that promotes family planning and HIV/AIDS prevention through social marketing in order to help Nigeria achieve its goals for increasing its contraceptive prevalence rate. DKT offers Nigerian women a variety of choices from a wide range of quality contraceptive products and increases contraceptive accessibility and availability across Nigeria. DKT Nigeria was funded to implement the private sector DMPA-SC program in Nigeria described in this article. The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of their employing organizations or of the sources of funding.

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**Introduction**

Registered in over 25 countries and the European Union, DMPA-SC (depot medroxyprogesterone acetate administered subcutaneously; brand name Sayana Press) availability is expanding worldwide. DMPA-SC has an all-in-one injection system and studies have shown DMPA-SC to be safely and easily administered by lower-level health cadres such as community-based health workers, and even by women who self-inject. Studies examining the introduction of DMPA-SC in a variety of pilot settings show high acceptability among users, high desire to continue with the method, and increased contraceptive continuation. DMPA-SC has a contraceptive efficacy and safety profile equivalent to that of DMPA-intramuscular. Because of the popularity of injectable contraceptives among women in many resource-poor settings, adding DMPA-SC to the contraceptive method mix holds promise for reducing unmet need for contraception, especially in high-fertility countries.

Results from pilot experiences lent critical evidence for the scale-up of DMPA-SC, for which many countries are in the processes of planning. However, no studies have explored users’ experiences with DMPA-SC within the context of national scale-up. While pilot settings offer program implementers more control for focused learning and experimentation, lessons from pilots may lack generalizability, particularly for programs that will ultimately operate in complex, mixed public-private health systems. Many operational and implementation challenges may only surface when programs are scaled and delivery systems interact with the full array of actors and environments within their communities.

For the DMPA-SC program in Nigeria, national scale-up through a total market approach was the objective from the outset. Although the program took a phased geographic and sectoral approach, the program was implemented to attain high population coverage at each step. A more rigorous and research-based monitoring and evaluation effort (M&E) was mounted alongside program implementation to maximize learnings for each phase of program scale-up. Lessons learned from the first phase of implementation, which focused only on introducing DMPA-SC through private sector social marketing, have been published elsewhere. Here, we report on the results of the second phase of implementation, which expanded private sector distribution and initiated public sector delivery. This paper aims to compare user experiences in acquiring DMPA-SC across public and private sector service providers, characterize their sociodemographic profile differences, analyze their reasons for choosing their provider, and assess the quality of care received. The results highlight important considerations for service delivery in future efforts to expand the use of DMPA-SC in Nigeria and beyond.

**DMPA-SC scale-up in Nigeria**

In Nigeria, where the modern contraceptive prevalence rate (mCPR) remains low (19% among all married women in 2018), DMPA-SC was introduced as part of a larger public health initiative to reach 27% mCPR by 2020. In 2015, DKT Nigeria introduced DMPA-SC in seven states in South West Nigeria through social marketing and private sector channels. Key features of this program included supply-side innovations (e.g., targeting high-volume contraceptive service health facilities and drug shops and offering rewards for bulk purchases, distributing through existing wholesale distribution channels, and in-facility trainings for participating providers) and demand generation activities that leveraged online and social media platforms in addition to traditional media approaches. DKT Nigeria initiated a community-based distribution (CBD) model, one that sought to capitalize on a recent government task-shifting policy that empowered community health extension workers (CHEWs) to administer injections. The CBD model proved difficult to adapt for these workers, many of whom preferred to work inside public health facilities giving out free commodities, rather than work in the community on a performance-based remuneration scale; DKT Nigeria ultimately phased out the model after attempts to restructure the program.

In 2016, as part of continued scale-up efforts, private sector distribution of DMPA-SC was expanded to all states in Nigeria. DKT Nigeria focused its supply-side activities on training additional private providers and distributing to high-volume contraceptive service health facilities and drug shops, wholesale suppliers, and professional health worker associations. In early 2017, DKT Nigeria completed a series of demand-side activities begun during the final stages of the introductory phase (late 2016): (a) airing education and interactive audience call-in programs on traditional mass media (e.g., television, radio); (b) leveraging digital and online media with an independent brand and website (honeyandbanana.com) focused on SRH; and (c) using social media platforms for messaging and live chat fora (e.g., Facebook, Instagram, Twitter). Throughout the scale-up period, as they had during the introductory phase, DKT Nigeria continued to operate an automated, free text message service to remind DMPA-SC users of their next reinjection.

Public sector delivery launched in late 2016, coordinated by UNFPA Nigeria and implemented through three local non-governmental organizations (NGOs) to deliver free contraceptive services including DMPA-SC to targeted (primarily urban and peri-urban) areas in 10 states. The program and its lessons learned are described in detail elsewhere. UNFPA Nigeria based its service delivery model on a DMPA-SC pilot as part of a larger family planning project leveraging CBD previously conducted in two states (Kebbi, Ebonyi). To conduct CBD, UNFPA and its implementing partners recruited and trained volunteers, including individuals who operated businesses in local markets, members of youth organizations, previously-trained community oriented resource persons (CORPS), health volunteers, and other candidates who met minimum qualifications (e.g., completed primary school, proficient in spoken English), as lay health workers. Volunteers were trained to provide contraceptive information, offer counseling on contraceptive services, provide nonprescriptive methods (e.g., condoms and pills), and refer clients to trained CHEWs for DMPA-SC initiation and other prescriptive contraceptive services. Each NGO made adaptations of this basic model to fit their operational expertise and the needs of local contexts. For example, proactive door-to-door household canvassing was used as an outreach strategy for more conservative areas in Northern...
Nigeria. All services and products in the public sector program were given free of charge.

Due to a challenge in product procurement in early 2017, both private and public sector scale-up activities were delayed. Although some training for public sector providers and volunteers occurred during the months of procurement delay, service delivery did not commence until March 2017, when new stock was acquired. Similarly, private sector distribution of DMPA-SC was halted from November 2016 until April 2017. After the procurement delay ended, DKT Nigeria required an additional month to repackage DMPA-SC from high-quantity (200 units) boxes into single-unit packs that were more suited for retail sale to clients by private providers. By the end of 2017, over 120,000 units of DMPA-SC were administered to women through the public sector program. In the private sector, only distribution numbers for DMPA-SC sales to providers and wholesalers were able to be tracked, showing an increase of 420,000 units over the year (from 726,700 in January 2017 to 1,150,415 by December 2017).

Monitoring and evaluation conducted alongside program implementation during this scale-up phase (late 2016 through 2017) was standardized to enable comparisons in service delivery across sectors to the text feasible, and inform further program expansion efforts in Nigeria. A mixed-methods approach to data collection was designed to monitor and assess a set of key performance indicators (KPIs) for program activities, outputs, and outcomes. A large set of KPIs were focused around the quality of the user experience in care-seeking for contraceptive services and provision of DMPA-SC across health sectors.

**Methods**

**Data collection**

We calculated KPIs related to user experience from responses to a phone survey conducted with a subset of DMPA-SC clients who had consented to be contacted after their encounter with the provider. Our recruitment flow chart is illustrated in Figure 1.

During training, participating public sector providers and volunteers (N=3,912), including facility-based clinicians, CHEWs, and CBDs, were instructed to screen all clients acquiring DMPA-SC for their willingness to be contacted. Of 144,505 clients receiving health services through UNFPA, 116,614 received DMPA-SC, of whom a total of 1,156 clients consented to be contacted during their encounter with their provider. After internal data transfer, validation checks, and quality screening, register information with phone numbers were transferred to the M&E survey team in three tranches: August 2017, November 2017, and January 2018.

For private sector providers supplied by DKT Nigeria, DKT outreach personnel distributed a client register to each selected facility to collect potential survey participants. In two one-day sessions, DKT Nigeria outreach personnel were trained on explaining the purpose of the research to providers, instructing providers on how to complete the registers and seek consent for research from eligible clients. To maximize the number of potential respondents, only high-volume facilities were targeted for client register data collection. DKT Nigeria provided a list of 250 DMPA-SC participating providers, of which 187 were excluded due to duplicate records, incorrect data, and missing contact information. Of 63 providers who filled in information on the client registers, 555 clients received DMPA-SC and 532 consented to be contacted. We periodically contacted participating private providers (every 4–6 weeks) to extract information on eligible clients and their contact information from the registers. The sample size was one of convenience, and no attempt was made to control for bias during recruitment and enrollment.

Phone interviewers contacted all clients who had provided verbal consent and phone numbers for survey purposes. Phone

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**Figure 1. Recruitment flow chart.**
interviewers were bilingual in English and one other language relevant to program geography (e.g. Yoruba, Hausa, Pidgin, Ibo, Ibibio) and received three days of training on contraceptive methods, survey procedures, how to obtain informed consent, tips for administering questionnaires, and guidance on completing the data collection tool. We adapted the survey instrument from a previous version used as part of the M&E for the DMPA-SC introductory (2015-2016) phase\(^{14,15}\). Changes were made to incorporate public sector program features and adjustments made to the private sector program (e.g. the cessation of the private-sector CBD program). The questionnaire\(^{22}\) collected information on user characteristics (e.g., age, marital status, wealth), past contraceptive use, the quality of counseling, and other aspects of the care-seeking experience. The instrument was pre-tested in May 2017 among a small set of clients across different states (e.g., Abia, Cross River, and Kaduna) and revised before being encoded in Open Data Kit for electronic data capture on the SurveyCTO mobile application. The survey was conducted on a rolling basis from October 2017 to February 2018. Up to five attempts were made to contact each potential respondent before the survey was deemed incomplete. Interviews lasted about 15 minutes and respondents received compensation of 200 Naira (~$US 0.55) of mobile phone credits upon completion.

In total, 459 clients completed a survey. Among public sector program clients, 235 (25.8\%) completed a survey, ranging from one to five months following the time of injection (median=three months); the remaining clients did not complete a survey due to being unreachable (n=488; 53.5\%; e.g., incorrect phone number, did not pick up), ineligible (n=124; 13.6\%; e.g., did not obtain DMPA-SC), or refused to participate (n=32; 3.5\%). Among private sector program clients, 224 (42.1\%) completed a survey, with a median follow-up at two months from the time of injection; 308 did not complete a survey due to similar reasons.

Data analysis
From the phone survey data, we first described our sample of 459 DMPA-SC users’ sociodemographic backgrounds (age, marital status, education, wealth, past modern contraceptive use, and region) by program sector (i.e., public vs. private). We coded past modern contraceptive use based on answers to the question, “Before using the Sayana Press injection, have you ever used a contraceptive method?” State of residence was grouped into region categories—North, Central, and South—based on respondent confirmation of their location during the interview. Using multivariate logistic regression, we examined the sociodemographic predictors of accessing DMPA-SC from a public provider (relative to a private provider) among survey respondents.

We then examined outcomes related to four steps in the care-seeking process: (1) becoming aware of DMPA-SC, (2) choosing a provider, (3) choosing DMPA-SC from among method options, and (4) the quality of care experienced. Survey responses for the questions, “How did you hear about the Sayana Press injection,” “What is the main reason why you receive the contraceptive from this place or person,” and “What made you interested in switching to Sayana Press?” were graphed to visualize differences in responses across sectors and formally tested with chi-square tests. All statistical analyses were conducted in Stata (v14.2, College Station, TX).

We measured quality of care through 14 questions related to information offered by providers, interpersonal experience, and method choice. We analyzed individual question responses and as a summary measure aggregating all items. Most quality of care questions were based on previous frameworks for measuring contraceptive service quality\(^{23,24}\), and had been tested for validity and reliability during the DMPA-SC introductory phase\(^{15}\). Following methods we previously used to create summary quality measures for contraceptive counseling, we coded responses corresponding to the higher-quality outcome for each component item with a “1”; for two interpersonal measures, the higher-quality outcome was considered to be a response of “no” for feeling treated differently because of one’s age or marital status. A “high quality” indicator was then constructed from the summary quality score to identify scores equal to the median (score of 12) or higher. We tested differences in responses across sectors using logistic regressions controlling for age, marital status, education, wealth, past modern contraceptive use, and region of residence.

Ethical approval
The Institutional Review Boards at the University of California, San Francisco (IRB# 15-18353) and the Nigeria Health Research Ethics Committee (NHREC/01/01/2007-06/01/2016 and NHREC/01/01/2007-16th/02/2017) approved this research.

Results
Sample characteristics
A full dataset is available on Harvard Dataverse\(^{22}\). Demographic characteristics for survey respondents are described in Table 1. Compared to survey respondents who obtained DMPA-SC from a private provider, those who saw a public provider were more likely to be under age 25 (18.3\% vs. 6.7\%; OR=2.93, 95% CI 1.36-6.35, p = 0.006) and less likely to have either completed secondary school or have some college/university education (OR=0.46, 95% CI 0.23-0.96, p=0.037 and OR=0.44, 95% CI 0.20-0.94, p=0.035, respectively). Although a larger percentage of public sector respondents were unmarried and from poorer wealth quintiles compared to private sector respondents, these differences were not statistically significant. Both programs had similar proportions of respondents who had never used modern contraception prior to DMPA-SC: 60.3\% among private sector respondents and 58.7\% among public sector respondents. Nearly all private sector respondents (92.0\%) were from the South (primarily Oyo and Lagos); approximately half (51.9\%) of public sector respondents were from the North (nearly equal numbers from Kaduna and Kebbi) with 38.7\% from the South (N\(_{\text{South}}=53, N_{\text{Kaduna/Kebbi}}=29\); only 9.4\% were from Central states (nearly equal numbers from Benue and Abuja). Among public sector respondents, fewer respondents in the North were married (76.2\% vs. 82.4\% in South and 50\% in Central; p=0.006), were new users of modern contraception (50\% in North vs. 73.6\% in South and
45.5% in Central; p=0.001), and from the richest wealth quintile (72.1% vs. 94.5% in South and 86.4% in Central; p=0.000); no differences were found by age or education categories.

**Becoming aware of DMPA-SC**

The source of awareness about DMPA-SC is displayed in Figure 2. Overall, 43.1% of respondents had heard of DMPA-SC through a friend or family member and 41.5% through a provider, followed by 14.6% at outreach in the community and 1.8% from a media source. Higher percentages of respondents attending public providers heard about DMPA-SC through a friend or family member and outreach in the community (50.9% and 15.6%, respectively) compared to their private sector counterparts (36.8% and 3.7%, respectively). In contrast, higher percentages of respondents attending private providers heard about DMPA-SC directly from their provider or through different media outlets (48.5% and 11.0%, respectively) than among public sector respondents (32.7% and 1.8%, respectively).

Choosing a provider

Convenience was the most common reason for choosing a provider among all respondents (43.8%; see Figure 3), with more public sector respondents (53.6%) citing this reason than private sector respondents (33.5%). Going to a usual or past provider was the second most common reason given (22.8%), followed by recommendation from friends/family (15.2%). Private sector respondents were more likely to choose the provider whom they usually go to or had gone to before (32.1%) or for quality-related reasons (15.2%) than their public sector counterparts (13.7% and 8.2%, respectively). However, more public sector respondents stated that the provider came to their house (5.6%), which was minimal among private sector respondents (0.4%) and which reflected the proactive CBD model.

Choosing DMPA-SC from among method options

Providers’ recommendation was the most common reason given for choosing DMPA-SC (41.0% among all respondents), with more private sector respondents giving this reason (51.8%) than public sector respondents (30.8% Figure 4). Ease of use was also the reason for uptake among 32.2% of all respondents, followed by effectiveness (16.9%), potential for fewer side effects (13.8%), among others. More public sector respondents cited reasons related to specific DMPA-SC features than among private sector respondents: ease of use (38.0% and 26.1%, respectively), ease

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**Table 1. Demographic characteristics and predictors of using a private or public facility.**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Program sector</th>
<th>Predicting use of public sector program*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private</td>
<td>Public</td>
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<tr>
<td><strong>OR</strong></td>
<td><strong>95% CI</strong></td>
<td><strong>p-value</strong></td>
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<tr>
<td>Age</td>
<td></td>
<td></td>
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<tr>
<td>% Under 25</td>
<td>6.7%</td>
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<tr>
<td>% 25 and older</td>
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<td></td>
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<tr>
<td>Secondary</td>
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<td>49.8%</td>
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<tr>
<td>College/University</td>
<td>31.3%</td>
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<tr>
<td><strong>Wealth quintile</strong></td>
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<tr>
<td>Lower four quintiles</td>
<td>2.7%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Wealthiest quintile</td>
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<td>82.1%</td>
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<tr>
<td><strong>Past modern contraceptive use</strong></td>
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<td>Past user</td>
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<td><strong>Region</strong></td>
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<tr>
<td>North</td>
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<td>Central</td>
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<tr>
<td>South</td>
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<td>38.7%</td>
</tr>
<tr>
<td><strong>N</strong></td>
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</tr>
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</table>

*Missing data for one private sector respondent and two public sector respondents; Nprivate=223, Npublic=233.

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*Excludes three observations with missing education data.
Figure 2. Source of awareness about DMPA-SC. Chi-square test p-values: *p<0.05, **p<0.01; ***p<0.001.

Figure 3. Reasons for choosing their provider. Quality-related reasons include: treats me well, respects me, I trust this provider, the quality is good, they keep my info confidential, experts in family planning. Chi-square test p-values: *p<0.05, **p<0.01; ***p<0.001.
of access (10.7% and 4.5%, respectively), and longer duration (7.3% and 1.4%, respectively); no differences in responses were found for features related to side effects, effectiveness, or the smaller needle.

Quality of care experienced
More private sector respondents reported an overall high-quality summary score (62.9%) than public sector respondents (56.4%), but this difference was not significant (Table 2). Across items measuring information given, more private sector respondents than public sector respondents reported that the provider had asked about past experiences of side effects associated with another contraceptive method (77.9% vs. 63.0%), if she had any health issues (88.3% vs. 78.6%), and described possible side effects of DMPA-SC (79.6% vs. 71.9%). For both interpersonal measure items, more respondents attended by private providers reported being treated differently because of their marital status (13.9%) and their age (14.8%) than among those attended by public providers (6.4% and 10.4%, respectively). For method choice, private sector respondents were more likely to report that the provider had a moderate-to-strong preference on which method to choose (73.1% vs. 51.1%), but also more likely to describe a contraceptive method other than DMPA-SC (82.1% vs. 72.1%).

Discussion
Our assessment of the user experience in care-seeking for DMPA-SC during program scale-up in Nigeria suggests that the inclusion of DMPA-SC in the contraceptive method mix may be encouraging contraceptive uptake among women who have never used modern contraception before. While the extent of this expansion is unknown due to the limitations of our convenience sample of survey respondents (see limitations), the finding that many respondents were new users of modern contraception suggests that demand or need for contraception may be increasingly met where DMPA-SC has been made available as a method option. In fact, estimates of new users in the public sector obtained from our phone survey are conservative compared to all public sector program client records which indicate that, among all clients served, 78% were new users of modern contraception.

In addition, by using different models of service delivery, public and private sector modalities for contraceptive service provision including DMPA-SC may complement each other. Consistent with larger trends in contraceptive care-seeking and the differential availability of health providers across Nigeria, older, more-educated, and wealthier women tend to seek care from private sector providers whereas younger and poorer women may opt for free public sector services. In our DMPA-SC respondent survey, younger (under age 25) and less-educated women were similarly more likely to be serviced through the public sector program, even after controlling for differences across regions. For these subpopulations, the CBD-centered public sector approach may be helping to overcome many persistent barriers of contraceptive

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**Figure 4. Reasons for choosing DMPA-SC.** Chi-square test p-values: *p<0.05, **p<0.01, ***p<0.001.
access as evinced by the large portion of new users reached through this modality. Some of these reduced barriers may be related to structural factors, such as lowering the distance to, time for, and monetary costs of care-seeking, and addressing myths and misconceptions related to contraception. Others may be related to socio-behavioral factors, such as reducing the need to negotiate permission for seeking care or reducing associated stigma. CBD may be particularly important for overcoming the confluence of these barriers in Northern Nigeria where private health providers are less prevalent and sexual and gender norms more conservative. Past studies in Nigeria and beyond have also found that, compared to facility-based service provision, CBD yields higher contraceptive uptake by reaching more marginalized populations.

Indeed, the care-seeking experience across sectors reported by survey respondents support the notion that certain modalities of service provision may be more effective for reaching different subpopulations. For respondents of the public sector program, awareness of DMPA-SC (and by extension, contraception in general) mainly occurred through word-of-mouth—via friends/family or outreaches in communities—while factors for choosing a provider and DMPA-SC as a method were primarily related to the convenience of proactive CBD and ease of use of DMPA-SC. In contrast, care-seeking for private sector program was largely dominated by factors associated with their chosen provider, one who was often either conveniently located or was previously visited, and whose initiative was most often cited for becoming aware of and choosing DMPA-SC. Thus, it seems that DMPA-SC distribution through private sector channels continues to fulfill demand among consumers who more often seek care from providers at established facilities and drug shops, in contrast to public sector provision which may be more suited for individuals less likely to seek facility-based services. Our results also showed that the proportion of respondents who found out about DMPA-SC through media outlets was more prevalent among private sector respondents, an understandable finding given that they were the primary audience for the mass media campaign. However, respondents who became aware of DMPA-SC through mass media was low compared to other sources of information, which may reflect the longer time needed to influence care-seeking behavior through these approaches.

Our results also showed that there were areas in which the quality of care received by DMPA-SC users can be improved. Public sector providers were less likely to ask about general medical and contraceptive history or to describe anticipated side effects associated with DMPA-SC. In contrast, interactions with private sector providers were potentially more stigmatizing for younger or unmarried clients. Private providers may also have different attitudes towards clients with respect to their reproductive status and contraceptive use, which may affect the quality of care provided.

Table 2. Quality experiences comparison, between public and private facilities.

<table>
<thead>
<tr>
<th>Quality Measures</th>
<th>Private</th>
<th>Public</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information given</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provider asked if ever used a FP/contraceptive method before</td>
<td>90.2%</td>
<td>90.2%</td>
<td>0.978</td>
</tr>
<tr>
<td>Provider ask if ever experienced side effects from another contraceptive</td>
<td>77.9%</td>
<td>63.0%</td>
<td>0.001</td>
</tr>
<tr>
<td>Provider ask if you were planning to have more children</td>
<td>91.0%</td>
<td>88.5%</td>
<td>0.773</td>
</tr>
<tr>
<td>Provider asked if you have any health issues</td>
<td>88.3%</td>
<td>78.6%</td>
<td>0.000</td>
</tr>
<tr>
<td>Provider described possible side effects of DMPA-SC</td>
<td>79.6%</td>
<td>71.9%</td>
<td>0.010</td>
</tr>
<tr>
<td>Provider tells you what to do if any problems with DMPA-SC occur</td>
<td>80.1%</td>
<td>79.4%</td>
<td>0.414</td>
</tr>
<tr>
<td>Provider tells you how long DMPA-SC injection protects against pregnancy</td>
<td>96.4%</td>
<td>96.2%</td>
<td>0.166</td>
</tr>
<tr>
<td>Provider do anything to know if you were pregnant</td>
<td>88.8%</td>
<td>91.5%</td>
<td>0.477</td>
</tr>
<tr>
<td>Provider told you when to get your next dose of DMPA-SC</td>
<td>94.6%</td>
<td>96.2%</td>
<td>0.810</td>
</tr>
<tr>
<td>Interpersonal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did provider treat you differently because of your marital status?</td>
<td>13.9%</td>
<td>6.4%</td>
<td>0.004</td>
</tr>
<tr>
<td>Did provider treat you differently because of your age?</td>
<td>14.8%</td>
<td>10.4%</td>
<td>0.018</td>
</tr>
<tr>
<td>Method choice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provider had moderate/strong preference on which method to choose (vs. no or slight preference)</td>
<td>73.1%</td>
<td>51.1%</td>
<td>0.014</td>
</tr>
<tr>
<td>Provider described any other method besides DMPA-SC</td>
<td>82.1%</td>
<td>72.1%</td>
<td>0.000</td>
</tr>
<tr>
<td>User made decision on method</td>
<td>86.6%</td>
<td>81.6%</td>
<td>0.928</td>
</tr>
<tr>
<td>Summary quality score ≥12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary quality score mean (range: 0–14; median = 12)</td>
<td>11.31</td>
<td>11.25</td>
<td>0.789</td>
</tr>
<tr>
<td>Quality score ≥12</td>
<td>62.9%</td>
<td>56.4%</td>
<td>0.104</td>
</tr>
</tbody>
</table>

1 Differences in proportions between private and public sector respondents was tested using logistic regressions controlling for age, marital status, education, wealth, past modern contraceptive use, and region. The summary quality score reflects the sum of the 14 quality measure items. For each response, responses corresponding to the higher quality outcome were coded as “1.”
been more aggressive in specifying a method preference, but were more thorough in describing more than one method choice to clients. Training providers in these areas may help to improve women’s experiences when obtaining DMPA-SC, which may fuel word-of-mouth recommendations from friends, family members, and providers. While many previous studies have found poor quality of care for contraceptive services in Nigeria, particularly for younger or unmarried women, to the best of our knowledge, no previous studies have assessed quality across sectors.

Limitations
Our results should be interpreted cautiously and in light of several contextual factors. It is unknown how generalizable survey results are beyond the users completing the survey or how different women not responding to the survey were across implementing partners. Among private sector providers approached to participate in recruiting respondents, no registration database or standardized reporting formats existed previously from which a representative sample could be readily drawn. The resulting sample of providers and clients was highly skewed towards those in large urban areas in the South West, namely Oyo and Lagos, where contraceptive use is more prevalent and private sector providers relatively more abundant. In addition, young or unmarried women disproportionately declined to participate in the survey based on a comparison of the age profiles between survey respondents and the full client database available from the public sector program. All data collection activities excluded women without access to a telephone, who are likely to be poorer and from more rural locations.

Thus, quantitative survey results are unlikely to be representative and results should be cautiously interpreted. Experiences of survey respondents may not reflect more typical experiences of women reached through either the public or private sector programs. However, as the emphasis on CBD delivery of contraceptive services through the public sector departs from the usual mode of facility-based service provision, no pre-existing data exists to assess the representativeness of the resulting clientele served. Within the private sector sample, the general direction of biases is largely consistent with those documented in the Nigeria DMPA-SC private sector introductory phase, which showed that, in general, Nigerian women using longer-acting contraceptive methods are similarly older and wealthier than those not using contraception or using shorter-acting methods.

Conclusion
Limitations of our sample notwithstanding, our study provides some indication of the experiences of women obtaining DMPA-SC across a large swath of Nigeria and from both public and private sector channels. As Nigeria continues to scale DMPA-SC across the country through its total market approach, insights gained from the initial scale-up phase should be incorporated into future operational strategies, including the utility of the CBD approach to complement facility-based services, the centrality of the role of the provider within traditional facility-based care, and specific areas where training should be targeted to improve the quality of care for all women, especially younger ones.

Data availability
Underlying data
Primary data used in this article are available from the Harvard Dataverse, DOI: https://doi.org/10.7910/DVN/XCLNIS. The phone survey questionnaire, codebook, and dataset can be found within the folder “Phone survey 2017–2018.”

Extended data
The questionnaire used to guide the participant interviews is available from the Harvard Dataverse, DOI: https://doi.org/10.7910/DVN/XCLNIS.

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

Grant information
Support for this work came from several sources. Activities conducted by the University of California, San Francisco and UNFPA Nigeria were funded by the Children’s Investment Fund Foundation [no grant numbers] and the Bill & Melinda Gates Foundation [OPP1133271]. Program operations and implementation by DKT Nigeria were supported by the Bill & Melinda Gates Foundation [OPP1121204]. Program officers from these Foundations contributed to the overall objectives of the research and M&E portfolio.

However, the authors had sole responsibility and authority for the collection, analysis and interpretation of data, the writing of the manuscript, and in the decision to submit this article for publication.

Acknowledgments
The authors would like to thank the teams at Akena Associates Nigeria, the Association for Reproductive & Family Health, Planned Parenthood Foundation of Nigeria, Action Health Incorporated, and DKT Nigeria for their excellent work in the field and critical support of the M&E effort.

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community-based distribution program for scaling up DMPA-SC contraceptive services in Nigeria. 2018.


Hilary M. Schwandt
Fairhaven College, Western Washington University, Bellingham, WA, USA

The research article examines the differences between Nigerian women accessing DMPA-SC via the private and public sector.

I enjoyed the opportunity to read this manuscript - as the various ways contraception is provided in Nigeria is vast and it is interesting to consider who is attending which services and why for programmatic as well as future research implications.

I did notice that there was a lot of loss to follow-up in both samples, and I felt that is was not highlighted as much as it should be in the paper, as it is a major limitation. For example, the % lost to follow-up is not even reported in the paper for the private sector sample.

The high amount lost to follow up also made me wonder about who was not followed - and how this sample could be compared to those not followed. Most encounters with health providers in Nigeria involve data collection and recording. Would it be possible to use those health facility records to compare the demographics of those completing the phone survey and those who did not? Also, in the conclusion section the authors suggest a way to compare the samples - could this be more fully explored and included in the results section? So the discussion can be the place to compare those differences, not present them?

Finally, I found the high emphasis on CBD in the discussion section a bit unexpected. From my understanding from reading this paper, CBD was actually not used as much as expected and actually was ultimately phased out. It would be interesting to see the results presented by CBD delivery method, given the emphasis on this finding in the discussion.

It is also interesting that there are actually less differences between the public and private sector samples than one might expect - and the lack of attention to this finding in the discussion of the paper is noted as a missed opportunity to discuss and review the implications of this important finding.
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Contraceptive use, contraceptive service delivery

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 07 Jun 2019

**Jenny Liu,** University of California, San Francisco, San Francisco, USA

We already report the lost to follow-up for in the Methods section; Figure 1 also details every step of the recruitment process. We agree that this convenience sampling method is imperfect, and have thus highlighted this in the Limitations section.

The reviewer suggests analyzing client demographics from facility records. However, we state that “no standardized reporting formats exist” for private sector providers; standard registers are only used in public facilities (which is the patient registry we used to identify clients in the public program described in the paper). The lack of standardized forms was the motivation for distributing patient registers to private providers and later retrieving the register information to follow-up clients. We have added an additional explanation of this in the Methods section.

The reviewer suggests moving the analysis of sample bias from the Discussion to the Results. We state that we replicated the analysis of bias that we previously did in an earlier, referenced published paper. In our judgement, because the findings were similar to those of the previous paper, these did not constitute a significant contribution to the existing literature to be again reiterated as a main result in this paper. Thus, we leave this as a minor discussion point.

We would like clarify for the reviewer that community-based distribution (CBD) was central to the public sector program, not the private sector program which the reviewer seems to reference in her comment. The experience with CBD in the public sector program during the scale-up phase is the basis for the conclusions about CBD.
We hesitate to further emphasize the differences in sample characteristics across the public and private sector programs for the very limitations (point #1 above) of representativeness and loss to follow-up that the reviewer notes. Rather, we feel more comfortable in the comparisons of service outcomes, particularly those that use multivariate regression to control for confounders due to sample differences.

**Competing Interests:** No competing interests were disclosed.

Reviewer Report 24 January 2019

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Thank you for giving me the opportunity to review this article.

The overall write-up is good and well researched. It also indicates feedback from the end users.

However, there are some typo errors noted; these include:
- Page 3 under DMPA-SC Scale-up in Nigeria - the last line of first paragraph should read “to restructure the program”.
- Table 2: Line 5 and 16 - the p value should be approximated to 0.001.

I consider the article worthy of indexing after effecting the above noted minor correction.

Once again thank you.

**Is the work clearly and accurately presented and does it cite the current literature?**
Yes

**Is the study design appropriate and is the work technically sound?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**
Yes

**Are all the source data underlying the results available to ensure full reproducibility?**
Yes
Are the conclusions drawn adequately supported by the results?
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Reproductive health, endocrinology and fertility research

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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Author Response 07 Jun 2019

**Jenny Liu,** University of California, San Francisco, San Francisco, USA

We have corrected the typos noted.

**Competing Interests:** No competing interests were disclosed.