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Evaluation of immediate and sustained effects of transitioning quality long-acting reversible contraceptives (LARCs) services to public sector health facilities in Ghana: a pre-post intervention study

Yuen Wai Hung[1*], Sara Riese[2], Kofi Issah[3], Claudette A. Diogo[3] and Nirali Chakraborty[1]

Abstract

Background Long-acting reversible contraceptives (LARCs) are highly effective at preventing pregnancy and demonstrate favorable client satisfaction. However, limited knowledge, misconceptions, and concerns about side effects hinder LARC adoption. Marie Stopes International—Ghana collaborated with Ghana Health Service to implement a 5 year multifaceted intervention to transition quality LARC services from an outreach approach to being available in public sector health facilities. This study evaluates if the intervention resulted in immediate or sustained improvements in the provision of quality LARC services in the public sector.

Methods Using a pre-post intervention design, facility structural quality, providers' training, practice, and knowledge on the provision of LARCs, and clients' perceived service quality were assessed in 8 Ghanaian regions. Analyses compared endline and baseline data, categorized into two groups based on the program phase: Recent Intervention facilities and GHS Support facilities. Facility records on a 3 month volume of LARC provision were compared between the last quarters of 2019 and 2022. Multivariate logistic regressions of any increase in the volume of LARC provision were conducted with associated endline facility and provider characteristics summarized at the facility level.

Results Significant increases were found in the provision of IUD services among Recent Intervention facilities (CHPS facilities: T0 13%, T2 50%, $p < 0.001$; HC/Hospitals: T0 23%, T2 53%, $p < 0.001$), while almost all providers offered implant services across facility types and intervention phases. The proportion of providers ever been trained to insert LARCs increased. Immediate and sustained effects were found on knowledge of LARC provision. Although facilities had significant increases in usual IUD availability among those in Recent Intervention (CHPS: T0 13.0%, T2 50.0%, $p < 0.001$), availability of IUD decreased to pre-intervention level upon transition to GHS Support. Controlling for other factors, facilities which had transitioned to GHS support were far less likely than those in the Recent Intervention phase to have an increase in the volume of LARC provision.

Conclusions This 5 year collaboration between MSI-Ghana and the Ghana Health Service increased the capacity of providers at 210 GHS facilities to provide high-quality LARC services. Future programs to improve LARC provision

*Correspondence:
Yuen Wai Hung
waiwai@m4mgmt.org
Full list of author information is available at the end of the article

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in the public sector may also consider including sustainable interventions to strengthen logistical management systems and targeting barriers to LARC access in the community.

Plain Language Summary Increasing access to and use of modern contraception reduces unintended pregnancies and unsafe abortions, thereby decreasing maternal morbidity and mortality. Despite long-acting reversible contraceptives (LARCs) are highly effective at pregnancy prevention and favored by clients, utilization in many low- and middle-income countries has been low. In Ghana, less than half of women who want to delay, space, or limit childbearing use a modern contraceptive method. As the public sector is the predominant source of family planning services, improving the quality and provision of LARC services in the public sector has the most potential to increase women's access to LARCs. Marie Stopes International—Ghana collaborated with Ghana Health Service to implement a 5-year program to transition the provision of quality LARC services from its mobile clinic outreach model to public sector health facilities through a phased approach. We studied the immediate and longer-term effects on the provision and utilization of quality LARC services in the public sector. We collected three rounds of data from intervention facilities, associated providers, and clients. We found increased providers providing IUD services, trained in LARC provision, and increased and sustained knowledge needed for quality LARC services provision. Despite improvement, after the intervention ended, IUD availability at the facility decreased. Facilities that completed the intervention for at least several months were less likely to maintain the increased level of LARC provision than those still in the intervention or recently concluded. These findings underline the need for additional efforts to strengthen logistical management systems to ensure consistent provision of quality LARC services.

Keywords Long-acting reversible contraceptives, Service quality, Multifaceted intervention, Sustained effects, Ghana, Public sector

Background

Having the information and means to "decide freely and responsibly the number, spacing, and timing of children" is one of the fundamental human rights commitments made by governments. Increases in modern contraceptive use reduce unintended pregnancies and abortion rates, thereby reducing maternal morbidity and mortality [1–4]. Long-acting reversible contraceptives (LARCs), which include copper and hormone-releasing intrauterine devices (IUD) and subdermal implants, are highly effective at preventing pregnancy and have minimal user involvement after insertion [5]. The use of LARCs has demonstrated higher continuation rates than short-acting contraceptive methods across various low-income settings as well as favorable client satisfaction [6, 7]. However, LARCs' utilization has remained low in many low- and middle-income countries [8].

In Ghana, 40% of all pregnancies are unintended [9], contributing to the high rate of unsafe abortion and maternal mortality [10]. While modern contraceptive prevalence has increased among currently married women in the last decade to a modern contraceptive prevalence rate of 28% in 2022, only 47% of women who want to delay, space, or limit childbearing were using modern contraceptive methods [11]. Additionally, contraceptive use has been highly unequal across age, wealth, education, and sub-national regions [12]. Among married modern contraceptive users, the proportion using implants increased from 23% in 2014 to 28% in 2022, while the proportion using IUDs slightly decreased from 4% in 2014 to 3% in 2022 [11, 13]. A similar trend was found among sexually active unmarried modern contraceptive users.

Ghana's FP2020 commitments included increasing the modern contraceptive prevalence rate among currently married women and women in unions from 30% in 2020 to 44.4% and reducing the unmet need for contraception among sexually active adolescents from 57% to 30% by 2030 [14]. While LARC use could comprise a significant proportion of this use, challenges persist, limiting the demand, supply, and utilization of LARCs in Ghana. While over 90% of women know about implants, fewer than two-thirds of women have heard of IUDs [15]. Prior studies across Ghana also found misconceptions and concerns about side effects hindering LARC adoption, which indicated a lack of comprehensive contraceptive counseling and correct knowledge of the methods [16–21].

The public sector is the predominant source of family planning services in Ghana, particularly for LARCs, providing the services to more than 80% of users [13]. Nevertheless, recent surveys show significant proportions of facilities stocked out of IUDs (34%) and implants (19.5%) [22], creating barriers to service access for women. As such, improving the quality and provision of LARC services in the public sector has the most potential to increase women's access to LARCs. The Ministry of Health/Ghana Health Service (GHS) has collaborated with various health sector actors and partners to design innovative strategies and interventions aimed

at addressing FP barriers and sustaining high-quality FP services. Marie Stopes International—Ghana (MSI-G), an important provider of long-acting and permanent methods in Ghana and worldwide, collaborated with GHS to implement a 5 year program to transition the provision of quality LARC services from its mobile clinic outreach model to public sector health facilities through a phased approach. A systematic review found provider training on LARC use in low- and middle-income countries demonstrated varying positive effects on the use of LARC [23], while other health systems barriers and enablers also play important roles in contraceptive services provision [20, 24, 25]. Although programs that aimed to build the capacity of public sector health workers and public sector systems for LARC service delivery throughout the women's life course, including routine, post-partum, and post-abortion contraceptive provision, have been described [21, 25–29], limited evidence is available on understanding the sustainability of a large-scale public sector strengthening intervention on the provision of quality LARC services.

This study evaluates the immediate and sustained effect of MSI-G's intervention for the provision of quality LARC services in the public sector. It also assesses changes in the utilization of LARC methods over the period of this intervention and the associated facility and provider factors. The evaluation uses a pre-post intervention design.

Methods

Intervention description

Between 2018 and 2023, MSI-G received funder support to transition its focus from generating demand for and provision of LARCs using its mobile clinic outreach model to increasing the capacity of direct service delivery by GHS staff. The mobile clinic outreach model involved a team of MSI-G providers traveling monthly to rural and remote communities to provide free sexual and reproductive health services. To improve the sustainability of service provision and expand the availability of LARCs in the public sector, MSI-G and GHS designed an intervention to strengthen the public sector's capacity to provide quality LARC services. The intervention comprised two phases. The first phase, known as the capacity building team (CBT) phase, focused on using classroom and practical skills training to increase public sector providers' ability to provide IUD and implant insertion and removal, followed by monthly mentorship from an MSI-G midwife/trainer, as well as facility assessments to identify the equipment needed for high-quality service provision. MSI-G then provided the required equipment and logistical supplies to the facilities through the public logistic distribution system. In Ghana, only providers with midwifery training are eligible to provide all LARC services, while nurses are eligible to provide implant insertion and removal. The training was offered to cadres eligible to provide specific LARC services. The MSI-G team also worked with the supported facilities on demand generation, stock management, adherence to clinical quality standards, and data entry requirements. Demand generation activities for LARCs were conducted before the monthly mentorship visits from the MSI-G midwife/trainer to facilitate sufficient client flow for the mentorship visits. Besides the provision of training, MSI-G conducted clinical and competency assessments to ensure providers' competency post-training. Before the facility transitioned to the next phase, providers at the facility were required to reach a specific standard level of competency. Facilities were in the CBT phase between 10 to 18 months before entering the next phase, which had the same duration as the CBT phase.

The second phase of the program was the continuous supportive supervision (CSS) phase where the focus was on the sustainability of quality services. Facilities participated in ongoing quality monitoring and supportive supervision through quarterly clinical quality assurance or data monitoring. These supportive supervision visits were conducted collaboratively with MSI-G and GHS regional staff to facilitate continued supervision upon withdrawal of program support. Facilities provided LARC services for free on the monthly (CBT phase) and quarterly mentorship visits (CSS phase) from MSI-G midwives/trainers, and commodities were supplied by MSI-G. Health centers, hospitals, and Community Health and Planning Services (CHPS) facilities were chosen across eight regions in conjunction with regional and district-level GHS representatives from facilities already participating in MSI-G's outreach activities. Facilities were enrolled in the program in a staggered manner between late 2018 and 2021 (Fig. 1). The evaluation began in 2019 and concluded with the end of the funder-supported intervention.

Study design

This study used a pre-post intervention design with no controls. Although external controls (sites and providers not receiving the intervention) were not feasible due to the wide array of donor supported contraceptive interventions occurring in Ghana, the staggered introduction of the intervention allowed for longitudinal comparisons, with facilities and providers serving as their own controls. This study was designed to assess the intervention's immediate and sustained effects on the capacity of public sector health providers and facilities in the provision of quality LARC services, clients' perceived service quality, as well as utilization of LARC methods. Using a provider questionnaire, we measured

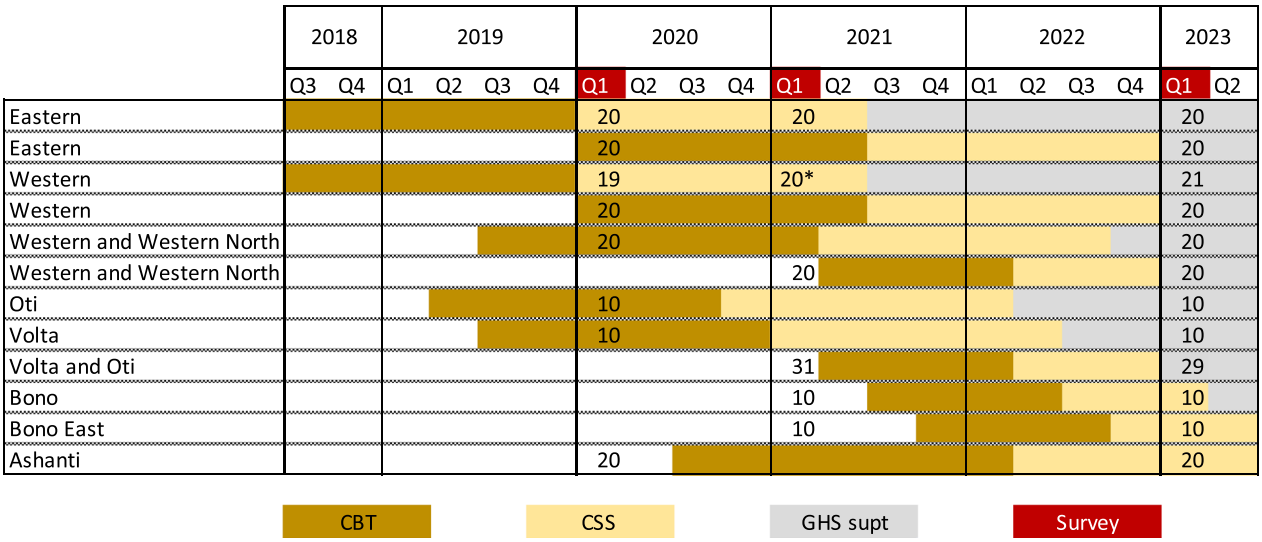


Fig. 1 Diagram of data collection, based on intervention roll-out

providers' experience of training and practice of LARC methods, assessed knowledge of specific LARC methods' eligibility, safe insertion timing and duration, and side effects, and measured providers' attitudes about non-clinical perceptions about the provision of LARC based on client's age, marital status, and third party's consent. We used a facility quality assessment to assess the availability of commodities, infection prevention practices, and functional equipment in relation to the provision of quality LARC services. We also measured clients' perceptions of service quality through client exit interviews.

Facility eligibility for the evaluation comprised all facilities that were to be offered the intervention—a decision made jointly between MSI-G and GHS. Providers were eligible for inclusion if they were working at a facility selected for the intervention and provided family planning services, with a preference for those who were providing IUD or implant services and having been identified by the intervention to receive training. At endline, all providers previously interviewed and working within the intervention facilities were interviewed. Replacement providers, to ensure the same number of observations per facility at each round of data collection, were selected according to initial eligibility criteria. Clients were eligible for participation in the study if they were women of reproductive age (15 to 49 years old), and received a reversible modern contraceptive method that required a commodity at the selected facility on the day(s) of data collection. Informed consent was required for study participation for all eligible facilities, providers, and clients. All components of data collection were approved by the ethical review committee in Ghana Health Service (reference number GHS-ERC016/10/19).

Data collection

Following the phased program implementation, the study collected baseline data from two different periods, February to March 2020 and February to April 2021, and endline data from February to May 2023 (Fig. 1). Based on the study design, the data collection consisted of three components using the designed instruments: (1) structural quality assessment at the facility level; (2) provider questionnaire on training, knowledge, practice, and attitudes on the provision of LARCs; and (3) client exit interview on perceived service quality and experience.

Data were collected by a contracted company not involved in the program. Data collection staff received training and field practice for all three components of data collection with the study instruments. At each facility, a facility survey was conducted through observation and by interviewing facility leadership, provider interviews were completed for between one and three providers who met the inclusion criteria, and client exit interviews were conducted with FP clients proportionate to client volume at the facility over three days. Eligible providers were randomly selected if there were more eligible providers than the required sample size at a facility. Due to low client volume at some facilities, convenience sampling was used to select eligible clients for the study. Data were collected in person for all three components using an electronic platform. Consent was obtained for all three components of data collection.

To compare the baseline and endline volume of LARCs provided at the program-supported facilities, data was

extracted from the logistics management information system (eLMIS). Aggregated monthly data for the period of October to December 2019 and 2022 were extracted on the number of LARC commodities dispensed at each facility.

Sample

Baseline and endline data were collected at 210 facilities located across eight regions in Ghana (out of 212 facilities in the intervention, with the remainder not consenting to participate). The first baseline data included 139 facilities and the second baseline data included 71 facilities, all of which were included in the endline data collection. 197 providers, 75 providers, and 337 providers were surveyed in the first baseline, second baseline, and endline data collection, respectively. Eligible providers were listed alphabetically by cadre and first name, and 1 or 2 providers were systemically selected, prioritizing trained midwives, who are usually present at health centers. To achieve the desired sample of 1164 clients, an average of 5.5 clients per facility, sampled proportionate to facility volume, was sought. Clients were systematically selected throughout the day based upon average facility volume, in order to achieve the desired sample size within 3 days. The first baseline data collection surveyed 552 clients, the second baseline data collection surveyed 438 clients, and the endline data collection surveyed 1,136 clients.

Data analysis

To assess the immediate and sustained effect of the program, analyses primarily included a comparison of the endline and baseline data, categorized into two groups based on the program phase the facilities were in during baseline and endline data collection (Fig. 2):

Recent intervention

Facilities (n = 129) came from Eastern (n = 20), Western (n = 20), Western North (n = 20), Oti (n = 14), Volta (n = 15), Bono (n = 10), Bono East (n = 10), and Ashanti (n = 20) regions (Fig. 3). During baseline data collection, these facilities had not received any aspect of the intervention (T0). At the endline data collection, these facilities either recently ended the CSS phase (within three months of the data collection) or remained in the CSS phase (T2).

GHS support

Facilities (n = 81) came from Eastern (n = 20), Western (n = 35), Western North (n = 6), Oti (n = 10), and Volta (n = 10) regions. These facilities began the program between 2018 and 2019. During the first baseline data collection, these facilities had been exposed to the intervention for more than six months (T1). At the time of the endline data collection, these facilities had ended the CSS phase (end of intervention) and had not received MSI-G support for at least five months (T3).

Descriptive summary statistics were calculated for each of the two groups (Recent Intervention vs. GHS Support), comparing baseline (T0/T1) and endline (T2/T3) for data on facility quality, providers' training, knowledge, practice, and attitudes on the provision of LARCs, and clients' perceived quality of services. Responses were stratified by facility type where appropriate. For matched responses between baseline and endline (facility assessment), McNemar's test, marginal homogeneity test, and Wilcoxon Signed-Rank test were conducted to identify if the differences in summary statistics were statistically significant between matched baseline and endline data for binary responses, categorical responses, and continuous responses, respectively. For non-matched responses (provider questionnaire and client exit interviews), the Wilcoxon rank-sum test and chi-square statistics were used for estimating the statistical significance of differences in continuous and categorical responses, respectively.

Facility records on the 3 month volume of LARC provision (IUDs and Implants inserted) were compared between the last quarters of 2019 and 2022 to identify if LARC provision increased by 2022. To assess factors associated with any increase in facility level 3 month volume of LARC provision, endline facility and provider characteristics that were a major focus of the program were examined with univariate logistic regression. Multivariate logistic regressions of any increase in LARC volume provision were conducted with associated endline facility and provider characteristics

Recent Intervention		GHS Support	
T0	True baseline (pre-intervention)		
		T1	CBT or end of CBT phase
T2	Near end of CSS phase or recent end of intervention (within 3 months)		
		T3	Intervention ended and transitioned back to GHS Support (≥5 to 20 months)

Fig. 2 Timeline of data collection in relation to program phase

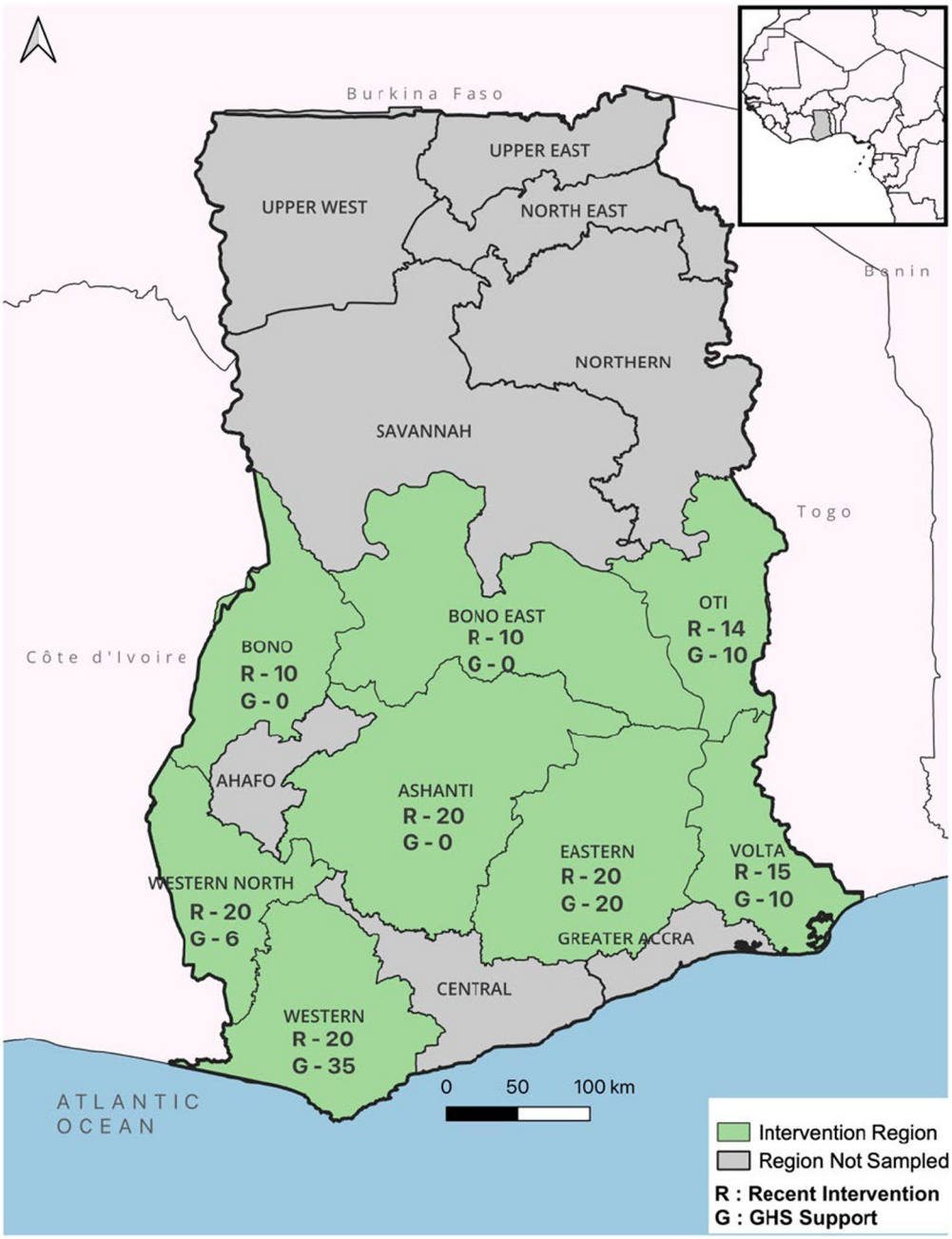


Fig. 3 Number of facilities by region in Recent Intervention and GHS Support phase

summarized at the facility level. The Akaike Information Criterion was used to select the most parsimonious model.

Results

Among providers surveyed at endline (n = 337), 32.3% were interviewed in a previous round of data collection. Demographics refer to all those interviewed at endline. 16% were male and 84% were female, with an average age of 32.6 years. Providers had been employed at their surveyed health facility for an average of 3.96 years. Among these providers, 112 (33%) were qualified as midwives or more senior, while 225 (67%) were community or staff nurses. Across all data collection, 2127 unique clients were interviewed. The average age of these female clients was 27.7 years, among

whom 28.3% were never married, and 69.8% were currently married.

Providers' service and training regarding LARC provision

LARC services offered by providers differed across the intervention period. While implant service provision was high before the intervention (T0 99%), and was common across the intervention period (Recent Intervention: T2 100%; GHS Support: T3 98%), few providers offered IUD services before the program (19%). Significant increases were observed in the proportion of providers providing IUD services among Recent Intervention facilities (providers in CHPS facilities: T0 13%, T2 50%, $p < 0.001$; providers in HC/Hospitals: T0 23%, T2 53%, $p < 0.001$). The proportion of providers offering IUD services at GHS Support facilities slightly decreased at CHPS facilities and was maintained at health centers/hospitals (CHPS facilities: T1 35%, T3 26%; HC/Hospitals: T1 43%, T3 43%).

The proportion of providers who had ever been trained to insert LARCs increased at all facilities by the end of the project (Table 1). At Recent Intervention facilities, the proportion of midwives and those with a higher position ever trained in IUD insertion significantly increased from 19 to 45% ($p < 0.01$). While the majority of nurses received training to insert implants before the intervention (T0), the proportion of nurses ever being trained in implant insertion increased by 20 percentage points at the endline ($p < 0.001$). The percentage of providers ever trained in IUD or implant insertion at GHS Support facilities remained similar, indicating a sustained level of trained providers after the intervention concluded.

Regarding implementation of LARC services, midwives or those with a higher position had a significant increase in ever having inserted an IUD (T0 12%, T2 42%, $p < 0.001$) and ever having removed an IUD (T0 25%, T2 44%, $p = 0.016$) at Recent Intervention facilities, and the proportions also slightly increased among those working at GHS Support facilities from T1 to T3 (Table 1). Across the intervention phase, most providers have inserted and removed an implant (90–99%).

Table 1 Percentage of providers trained and implemented implant or IUD insertion, by intervention phase

	Nurse				Midwife or higher position			
	Recent intervention		GHS support		Recent intervention		GHS support	
	T0 (N = 96)	T2 (N = 133)	T1 (N = 78)	T3 (N = 92)	T0 (N = 57)	T2 (N = 71)	T1 (N = 39)	T3 (N = 41)
Training								
Ever trained to insert IUD	NA				19.3	45.1**	43.6	46.3
Ever trained to insert implant	71.9	91.7***	91.0	89.1	82.5	88.7	84.6	97.6
Implementation								
Ever inserted an IUD	NA				12.3	42.3***	28.2	39.0
Ever removed an IUD	NA				24.6	43.7*	28.2	39.0
Ever inserted an implant	92.7	99.3*	98.7	98.9	98.2	94.4	94.9	97.6
Ever removed an implant	91.7	97.0	96.2	93.5	98.2	90.1	92.3	97.6

NA: nurses are not allowed to insert or remove IUD in Ghana

p-value * < 0.05; ** < 0.01; *** < 0.001

Table 2 Proportion of providers who correctly answered IUD and implant questions regarding eligibility, insertion timing and duration, and side effects

	Recent intervention		GHS support	
	T0 (N = 153)	T2 (N = 204)	T1 (N = 117)	T3 (N = 133)
At least 10 IUD eligibility questions correct (out of 13)	26.1	38.2*	31.6	42.1
At least 12 implant eligibility questions correct (out of 15)	22.9	34.8*	29.1	41.4*
At least 4 IUD insertion timing and duration questions correct (out of 5)	52.3	69.1**	59.8	62.4
At least 5 implant insertion timing and duration questions correct (out of 6)	81.7	87.3	78.6	82.0
At least 2 IUD side effects correctly identified	57.5	60.3	55.6	61.7
At least 3 implant side effects correctly identified	83.7	79.4	85.5	82.0

p-value * < 0.05; ** < 0.01; *** < 0.001

Providers' knowledge of LARC provision

Table 2 shows a summary of results from assessment of providers' knowledge on LARC eligibility, insertion timing and duration, and side effects. Knowledge of women's eligibility to use LARCs were assessed by a series of 13 IUD and 15 implant eligibility questions. Overall, the median number of questions that providers answered correctly increased across the project period (Fig. 4). Among those working at Recent Intervention facilities, the median number of correctly answered IUD eligibility questions increased from seven in T0 to nine in T2 ($p<0.001$). This improvement was sustained among providers at GHS Support facilities, with the median number of correct IUD eligibility questions slightly increased from eight to nine from T1 to T3 ($p<0.001$). Similarly, the median number of correctly answered implant eligibility questions also increased (T0 9, T2 11, $p<0.001$) among those working at Recent Intervention facilities and there was a slight improvement among providers at GHS Support facilities (T1 10, T3 11, $p=0.053$).

A higher proportion of providers were knowledgeable on IUD insertion and duration at endline than baseline among Recent Intervention facilities (4 or more correct out of 5 questions, T0 52%, T2 69%, $p=0.001$), and a similar level was maintained among providers at GHS Support facilities (T1 60%, T3 62%, $p=0.623$). Majority of providers had knowledge on implant insertion timing and duration (5 or more correct out of 6 questions) across intervention phase (>75%). Providers' knowledge on side effects of IUD and implant remained similar across intervention phase.

Non-clinical restrictions on LARC provision

Providers were asked if they imposed certain non-clinical restrictions on clients seeking various contraceptive methods. International guideline for providers states that nearly all women can use implants and IUD safely and

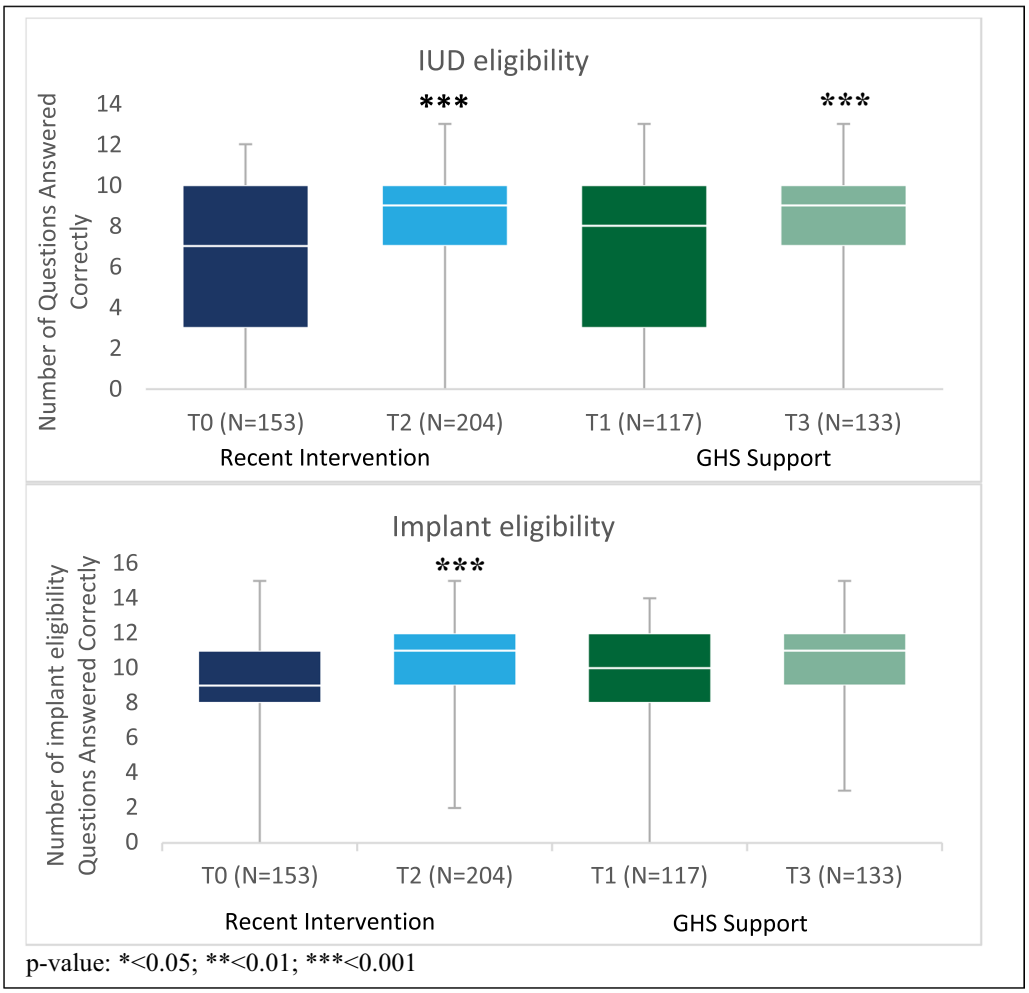


Fig. 4 Number of IUD and implant eligibility questions providers correctly answered by intervention phase

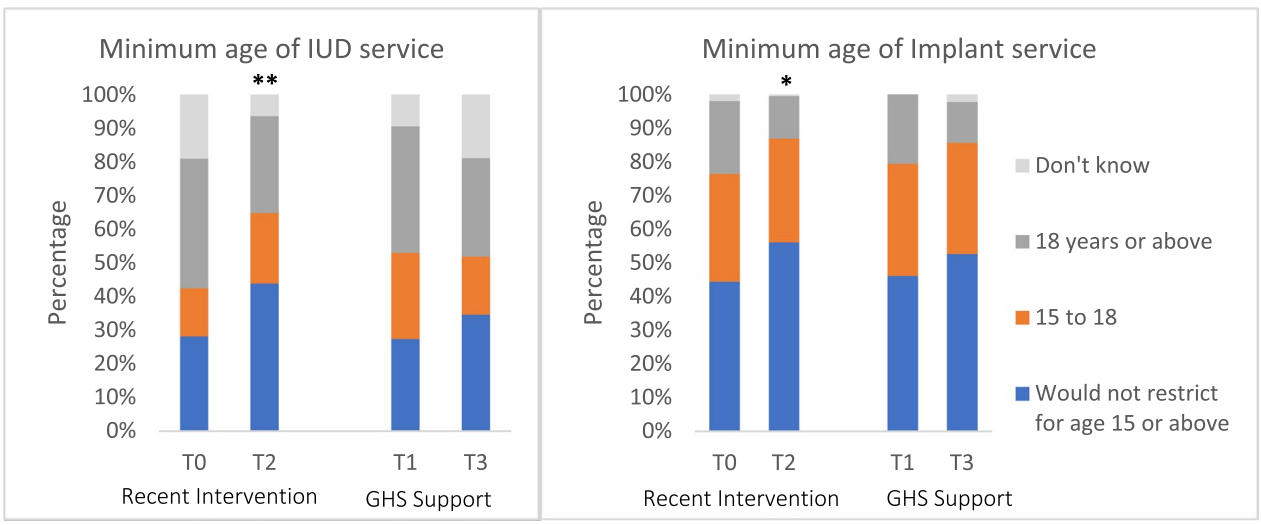
effectively, regardless of age, marital status, and make their own informed decisions to use contraceptives [30]. The 2014 National Reproductive Health Service Policy and Standards from Ghana Health Service states that women of reproductive age, including adolescents, are eligible for family planning services, including LARCs, regardless of their marital status, and consent from a partner or parent is not required [31]. Figure 5 shows the minimal age at which providers would offer the LARC methods. At Recent Intervention facilities, prior to the intervention, 39% of providers would only provide IUD service to clients 18 years or older. A higher proportion of providers reported not restricting the provision of IUD to clients aged 15 or above after the intervention (T0 28.1%, T2 43.9%, p = 0.003), while the proportion slightly increased at GHS Support facilities upon the end of the intervention (T1 27.4%, T3 34.6%, p = 0.291). Comparatively, a smaller proportion of providers would restrict implant service to only clients aged 18 or above than IUD service. A higher proportion of providers at Recent Intervention reported not restricting implant service for clients aged 15 or above at endline than baseline (T0 44.4%, T2 56.1%, p = 0.028), and a slight increase among providers at GHS supported facilities.

Before the intervention, the majority of providers imposed maximum age-based restrictions for LARCs (Fig. 6) at Recent Intervention facilities. After the intervention, significant increases were found in the proportion of providers not restricting IUD (T0 36.2%, T2 51.5%, P = 0.013) and implants (T0 38.2%, T2 52.9%, p = 0.002) for women less than fifty years old at Recent Intervention facilities; a similar level of increases in proportion were found among providers at GHS Support facilities upon the end of the intervention (IUD: T1 24.1%, T3 43.5%, p = 0.010; implant: T1 25.9%, T3 51.1%, p = 0.002).

Providers were also asked if they would provide a specific LARC method to an unmarried person and whether consent from another person besides the user would be required. Most providers at Recent Intervention facilities reported that they would offer the methods to an unmarried person, with no significant changes from T0 to T2 (IUD: T0 88.9%, T2 90.7%, p = 0.604; implant: T0 96.1%, T2 92.7%, p = 0.210), indicating that marital status was not a limiting factor in FP provision prior to the intervention and this remained true across the project. In GHS Support facilities, the proportion of providers reporting that they would offer implants to unmarried people increased (T1 89.9%, T3 97.7%, p = 0.015) while a similar proportion of providers would offer IUDs to unmarried people (T1 83.8%, T3 86.5%, p = 0.557). A similar proportion of providers required external consent besides the users in the provision of LARCs across the intervention among those in Recent Intervention (IUD: T0 14.4%, T2 13.7%, p = 0.859; implant: T0: 13.1%, T2: 11.2%, p = 0.633) and in GHS Support (IUD and implant: T1 9.4%, T3 11.2%, p = 0.617).

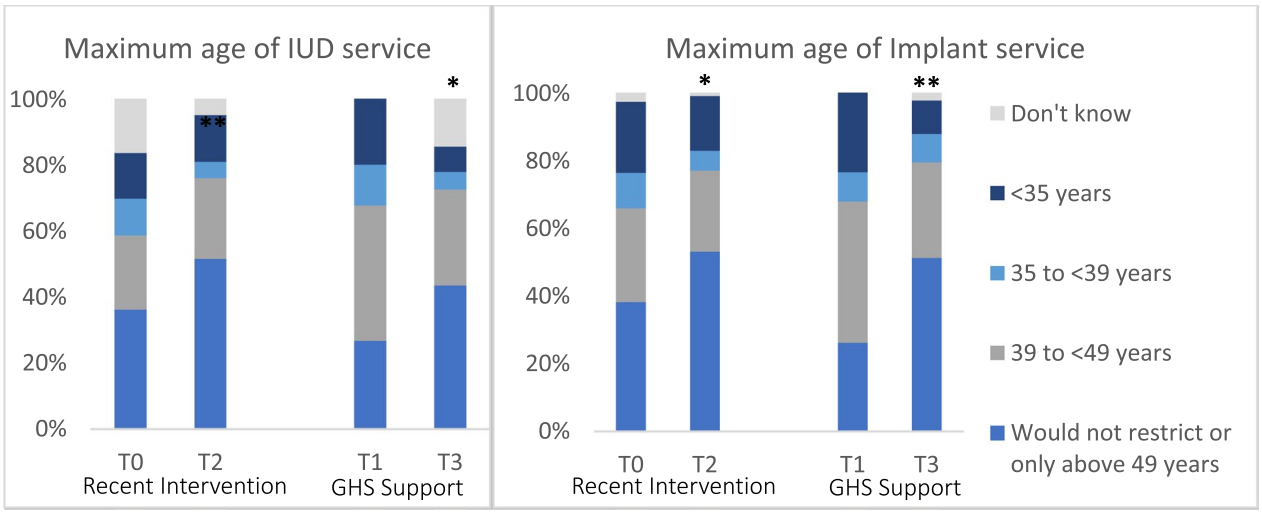
Facility level structural quality

At baseline, most facilities usually had implants in stock (Recent Intervention: CHPS 87.0%, HC or hospital: 88.2%) but few had IUDs usually available (Recent Intervention: CHPS 13.0%, HC or hospital: 25.0%). Both types of facilities had significant increases in usual IUD



p-value: *<0.05; **<0.01; ***<0.001

Fig. 5 Age below which provider would restrict IUD and implant service provision



p-value: *<0.05; **<0.01; ***<0.001

Fig. 6 Age above which provider would restrict IUD and implant service provision

availability among those in Recent Intervention towards the end of intervention (CHPS: T0 13.0%, T2 50.0%, p < 0.001; HC or hospital: T0 25.0%, T2 51.5%; p = 0.001) (Table 3). HC or hospitals also had a significant increase in day-of IUD availability (11.8% at T0 to 30.9% at T2, p = 0.007). IUD availability was very low among CHPS in GHS Support across the intervention. Both usual and day-of availability of IUD decreased upon facilities transition to GHS Support for both CHPS and HC or hospital, though the changes were not statistically significant from T1 to T3.

A facility's ability to provide LARC services is dependent upon both commodity and appropriate equipment availability. The facility survey asked about 42 clinical equipment and supplies, categorized here by their use. Table 4 shows the items included for each group of

Table 3 Proportion of facilities with LARC available at the time of the survey, by intervention phase and facility type

	Recent intervention				GHS support			
	CHPS (N = 61)		HC or Hospital (N = 68)		CHPS (N = 39)		HC or Hospital (N = 42)	
	T0	T2	T0	T2	T1	T3	T1	T3
IUD usually available	13.0	50.0***	25.0	51.5**	15.2	8.7	47.6	31.0
IUD available today	7.4	18.5	11.8	30.9**	8.7	4.3	28.6	14.3
Implant usually available	87.0	96.3	88.2	92.6	93.5	93.5	95.2	95.2
Implant available today	55.6	68.5	57.4	61.8	56.5	60.9	64.3	73.8

p-value * < 0.05; ** < 0.01; *** < 0.001

Table 4 Categories of FP equipment

Group	Equipment included
1. General FP provision	Flashlight OR working lamp, scale, BP gauge, thermometer, stethoscope, sample of FP methods, FP specific visual aids, pelvic model for IUD, model for condom use
2. IUD equipment (GHS definition)	Flashlight OR working lamp, examination bed/couch, sponge holding forceps, tenacula, speculums (small, med, large), uterine sound, disposal containers
3. Implant equipment	Scissors, canula and trochar (implant insertion kit), scalpel with blade, artery forceps, iodine OR antiseptic, xylocaine/lignocaine, sterile gloves, swab containers
4. Infection prevention supplies	Chlorine solution, sterile gloves, disposal containers, sharps containers, plastic buckets, running water, handwashing soap, pedal bin OR other waste receptacle, disposable latex

Table 5 Mean number of equipment items available at the time of survey by equipment group

	Recent intervention				GHS support			
	CHPS (N = 61)		HC or Hospital (N = 68)		CHPS (N = 39)		HC or Hospital (N = 42)	
	T0	T2	T0	T2	T1	T3	T1	T3
Mean (range)								
Group 1. General FP provision (9 items)	6.4 (1–9)	7.2 (3–9)**	6.5 (0–9)	6.8 (3–9)	7.5 (2–9)	7.5 (4–9)	7.5 (2–9)	7.7 (2–9)
Group 2. IUD equipment[a] (9 items)	4.5 (0–9)	6.3 (2–9)***	4.8 (0–9)	6.3 (2–9)**	5.2 (0–9)	5.9 (2–9)	6.5 (2–9)	7.1 (0–9)
Group 3. Implant equipment (8 items)	6.5 (1–8)	7.0 (1–8)*	6.2 (0–8)	6.8 (2–8)	6.3 (3–8)	6.7 (3–8)	6.9 (2–8)	6.9 (0–8)
Group 4. Infection prevention supplies (9 items)	8.1 (0–9)	8.3 (3–9)	7.7 (0–9)	8.1 (1–9)	7.9 (2–9)	8.4 (4–9)	8.6 (6–9)	8.5 (5–9)

p-value: * < 0.05; ** < 0.01; *** < 0.001

[a] GHS definition

clinical equipment and supplies. Table 5 shows the difference in the average number of equipment items available in Recent Intervention facilities and GHS Support facilities by intervention phase. CHPS facilities reported a significant increase in the mean number of available equipment items for providing general FP service, IUDs, and implants, from T0 to T2. Among HC/Hospitals, there were significant increases in the mean number of available IUD equipment items (Group 2). Among GHS Support facilities, no significant changes in equipment availability were found from T1 to T3 in either CHPS or HC/Hospitals as most of these facilities were provided with equipment prior to T1 data collection and similar levels at endline suggest they were maintained upon the intervention concluded.

The ability to appropriately process and sterilize equipment is essential for safe LARC provision. Table 6 shows the proportion of facilities sterilize their equipment and having functioning sterilization equipment or high-level disinfection equipment by intervention phase. Before the intervention, only 57% of CHPS facilities and 74% of health centers or hospitals sterilized their equipment. In both Recent Intervention and GHS Support facilities, the proportion of facilities processing or sterilizing any equipment significantly increased at endline. Facilities were also equipped with functioning sterilization or high-level disinfection equipment at endline, including GHS Support facilities.

Clients' reported service quality

We assessed service quality through client self-report, as there were no direct observations of client-provider interactions. One indicator, the Method Information Index, has been previously identified as an indicator of

Table 6 Proportion of facilities appropriately process and sterilize equipment

	Recent intervention				GHS support			
	CHPS (N = 61)		HC/hosp (N = 68)		CHPS (N = 39)		HC/hosp (N = 42)	
	T0 (%)	T2 (%)	T0 (%)	T2 (%)	T1 (%)	T3 (%)	T1 (%)	T3 (%)
Process/sterilize any equipment in this health facility?	57.4	93.4***	73.5	94.1**	61.5	89.7**	78.6	95.2*
If yes, facility has functioning Sterilization or high-level disinfection equipment	65.7	93.0*	66.0	89.1*	70.8	94.3	72.7	85.0

p-value * < 0.05; ** < 0.01; *** < 0.001

client-provider interaction, a component of service quality [32–34]. At Recent Intervention facilities, the proportion of clients who reported an MII score of three out of three (being informed about other methods of family planning, possible side effects of the method, and what to do if experience any side effects or problems) were similar across the intervention (CHPS: T0 74.9%, T2 72.0%, p = 0.676; HC/Hospital: T0 59.8%, T2 65.9%, p = 0.272). At GHS Support facilities, a higher proportion of clients reported an MII score of three at CHPS (T1 62.3%, T3 77.4%, p = 0.023) and HC/Hospital (T1 59.3%, T3 69.0%, p = 0.102) at endline, suggesting continued improvement in providing informed choice during counseling upon the end of the intervention.

Factors associated with an increase in volume of LARC provision at facilities

A multivariate logistic regression was conducted to identify associations between different endline intervention-related facility characteristics and an increase in 3-month volume of LARC provision between 2022 and 2019. More than half of the facilities (55.7%) had an increased volume of LARC provision when comparing the last quarter in 2019 versus 2022, with a mean difference of 1.47 LARC dispensed (IQR − 6.5, 15.5). Several characteristics were associated with the odds of a facility having an increase in the volume of LARC provision in 2022 compared with 2019 (Table 7). Controlling for other factors related to the intervention and facility characteristics, facilities which had transitioned to GHS support were far less likely than those in the Recent Intervention phase to have an increase in volume of LARC provision (aOR 0.192, 95% CI 0.100–0.370), and health centers or hospitals were statistically significantly less likely than CHPS facilities to have increased LARC provision (aOR 0.368, 95% CI 0.185–0.733).

Other factors related to the intervention were also associated with the odds of having more LARCs provided. At endline, controlling for other characteristics, facilities having at least one provider trained in implant and one provider trained in IUD (aOR 2.024, 95% CI 1.010–4.069), having at least one provider knowledgeable in implant eligibility, safe insertion timing and duration, and side effects (aOR 2.173, 95% CI 1.139–4.148), and having at least one provider who would not impose clinically incorrect age restrictions on implant service provision (aOR 1.913, 95% CI 1.005–3.642) were each about twice more likely to have an increase in LARC provision, controlling for other factors. The number of types of infection control supply at the facility was inversely related to the odds of increased LARCs dispensation, although the association was not statistically significant.

Discussion

This evaluation assessed the immediate and sustained effect of the phased intervention designed to transition quality LARC services from an international NGO's outreach provision to strengthening the public sector's capacity to provide the services in Ghana. The staggered intervention timeline allowed for this evaluation to compare outcomes within facilities over time, and also across facilities in two different phases of the intervention at the endline. Contrasting the longitudinal change of various outcomes between the Recent Intervention group and the GHS Support group indicated how the intervention might weather the test of time as the program withdrew support from GHS Support facilities for five to twenty

Table 7 Factors associated with the increase in volume of LARC dispensed at facilities between last quarter in 2019 and 2022

Variable	Odds ratio	95% CI
Type of health facility		
CHPS	(Ref.)	
Health center/hospital	0.368**	(0.185–0.733)
Current stage of intervention		
Recent Intervention	(Ref.)	
GHS support	0.192***	(0.100–0.370)
Endline facility characteristics		
Number of infection control equipment at facility	0.760	(0.565–1.022)
Having provider(s) trained in implant and IUD	2.024*	(1.010–4.069)
Having provider(s) knowledgeable in implant eligibility, safe insertion timing and duration, and side effects	2.173*	(1.139–4.148)
Having provider(s) not imposing clinically incorrect age restrictions on implant service provision	1.913*	(1.005–3.642)

p-value * < 0.05; ** < 0.01; *** < 0.001

months, while those in the Recent Intervention group either recently concluded the intervention or were still in the intervention at the time of endline data collection. Our findings suggest that although several aspects of the intervention effect have been maintained upon the intervention completion, improvements in LARC availability and LARC provision were not sustained.

Prior to the program, most facilities and associated providers had been providing implant services, but IUD services were not available at most CHPS and were very limited at health centers or hospitals. Major gaps were identified in training, stock availability, and equipment at facilities regarding IUD provision. Only 13% of CHPS and 25% of health centers or hospitals had IUDs usually available, and actual IUDs in stock on the day of assessment were about half of the usual availability. Additionally, the majority of the midwives and unit / facility-in-charges had never received training in IUD insertions. Working with local GHS management staff, the program provided training and mentorship on both implants and IUDs, resulting in an increased level of training for both types of LARCs. Despite challenges with provider turnover [35], positive effects of the training and mentorship were seen through increases in correct knowledge on eligibility and safe insertion timing and duration, reduction in clinical incorrect restrictions on LARC service provision, and increase in insertion or removal of IUDs and implants. These effects on providers were mostly sustained after the intervention concluded, which was expected in a multi-faceted intervention that focused on training with ongoing supervisory components [36–38]. While practice-intensive, experiential-based training may help with knowledge and skill retention [36], the inclusion of multiple reinforcing components (classroom and practical skills training, support on demand generation, on-the-job mentorship, clinical assessment, etc.) may have enhanced the retention of such positive effects [39–41]. However, due to the low frequency of IUD service provision upon transition to GHS support, the need for refresher training on IUD insertion and removal should be assessed.

The training and supportive supervision aspects of the intervention cannot alone increase and maintain LARC access for women. Consequently, the program also focused on improving the availability of necessary equipment and supplies at facilities. However, despite some improvement in increasing usual IUD availability at facilities, facilities were not consistently able to provide IUDs or implants during the intervention, even when trained providers were present. As MSI-G support concluded, we saw that IUD availability decreased to levels similar to pre-intervention. Prior studies have described several supply chain barriers contributing to high levels of stockout for contraceptive methods in low- and middle-income countries, particularly at local facilities in rural areas [42–44]. Challenges identified included having inadequate infrastructure such as a road network system to deliver from district to health facilities, inadequate funding for procurement of commodities, and a lack of adequate information about the demand for contraception. Even though these challenges are likely applicable to obtaining commodities for all contraceptives, the lower availability of IUD stocks may be exacerbated by a limited demand for IUDs. IUD utilization has been low in Ghana [11], and a previous study in a rural setting in Ghana indicated a lack of IUD-specific knowledge, a misconception of IUD side effects, a lack of IUD availability, and the perception that IUD insertion procedure being cumbersome and invasive when compared to implant insertion [45]. Although demand generation activities were conducted for both types of LARCs throughout and strengthened in the intervention, we hypothesize that a lack of critical mass or consistent demand for IUDs and the service provision limited to providers with midwifery training may result in facilities' decision not to stock IUD when transitioned to GHS Support, resulting in a cycle of low IUD supply and use, which was also described in another public sector strengthening program to provide LARCs in Uganda [25].

MSI-G support appears to play a significant role in creating and maintaining the provision of LARC services. We find that those facilities that still received MSI-G support, or where support ended within the past 3 months, maintained a higher volume of LARC services than pre-intervention. However, those facilities that transitioned to GHS Support were much less likely to maintain the increase in LARCs provided. Anecdotal discussion with MSI-G program staff and local GHS management suggested costs of service may be a contributing factor in reduced demand. During the intervention, facilities provided free LARC services during the monthly and quarterly mentorship visits from MSI-G midwives. The provision of free LARC services was perceived as a major appeal for community members to obtain the service. Upon the intervention's conclusion, facilities returned to a fee-for-service model [46]. Although family planning was added to Ghana's National Health Insurance Scheme benefit package in late 2021 and expanded to include free long-term contraception in January 2022 [47], discussion with local GHS management staff indicated that policy implementation had been limited at facilities.

A systematic review of training of healthcare providers and use of LARCs in several low- and middle-income countries found most studies demonstrated an increased uptake of LARCs after training of healthcare providers, though many of the studies included

additional aspects of intervention besides training [23]. Similar to prior studies, this program applied a multifaceted approach including training and mentoring. Although the evaluation was not designed to assess the effectiveness of specific intervention components, the association between desired program outputs and improvement in LARC dispensation volume suggests key aspects of the intervention in driving LARC uptake. In addition to IUD training, mentorship and equipment provision were also major foci of the intervention. It is important to consider that this project, while relatively large in scale and scope, covered only a fraction of GHS facilities. Prior assessment of primary care facilities' general service readiness in Ghana found a large proportion of CHPS and health centers/clinics were below average in general service readiness, with a wide variation within and across regions [48]. Facility readiness is also among the most important factors in women's choice of health care in Ghana [49]. Improving the high-quality provision of LARC methods requires facilities to have the necessary equipment, infection prevention supplies, and tools for equipment sterilization.

We acknowledge several limitations to this evaluation. First, the evaluation design did not include control sites for comparison, because GHS had not identified all the intervention sites at the start of the evaluation in order to be able to select nearby controls, and because facilities in districts not selected for the intervention were likely receiving interventions from other programs that could affect LARC uptake. As the intervention expansion was staggered, we worked with MSI-G to ensure that true baseline data were captured for selected facilities based on their intervention schedule. However, not all participating facilities had true baseline data. Second, facilities were followed only once due to resource constraints and the sample was divided into two groups, in which one included true baseline data and the other included true post-intervention data. We assumed comparability between these two groups of facilities but cannot rule out potential contextual differences due to geography, as program roll-out was designed partly based on districts and regions. While longitudinal comparisons were made to identify change, the applicability of the sustained effects on other facilities may be affected by other factors over time, such as the implementation of NHIS coverage of LARCs and the COVID-19 pandemic. Nevertheless, program implementation had minimal interruption during the pandemic as FP service continued to be provided. Third, while we would have ideally liked to determine if LARC clients were new or continuing users, these data were not available and we instead used data on overall IUDs and implants provided. Thus, we cannot determine if the program was associated with any change in new LARC use.

Conclusions

This 5-year collaboration between MSI-Ghana and the Ghana Health Service increased the capacity of providers at 210 GHS facilities to provide high-quality LARC services. LARCs play a major role in improving overall access to contraception, are cost-effective, and have been described as an important aspect of a comprehensive contraceptive program, and for reaching national and international goals. We found that while the program was time-limited, many of the positive effects on providers remained after intervention completion. However, continued dedicated logistical support is required to ensure consistent availability of quality LARC service. Furthermore, the scale-up of IUDs may require additional demand generation in the community to establish a positive cycle of supply and demand for IUDs in the public sector. Future programs to improve LARC provision in the public sector may also consider including sustainable interventions to strengthen logistical management systems and targeting barriers to LARC access in the community.

Abbreviations

aOR	Adjusted odds ratio
CBT	Capacity building team
CHPS	Community health and planning services
CI	Confidence interval
CSS	Continuous supportive supervision
FP	Family planning
GHS	Ghana Health Service
HC	Health center
IQR	Interquartile range
IUD	Intrauterine device
LARC	Long-term reversible contraceptive
MSI-G	Marie Stopes International Ghana
NGO	Non-governmental organization
NHIS	National health insurance scheme

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Author contributions

NC and SR conceived the evaluation and developed the protocol and instruments. NC and YH conceptualized the study and analysis. KI and CD were significantly involved in the intervention, contributed to project administration and facilitated data collection. YH conducted data analysis and drafted the manuscript. All authors reviewed, edited, and approved the final manuscript.

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Availability of data and materials
The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
All components of data collection were approved by ethical review committee in Ghana Health Service (reference number GHS-ERC016/10/19). Informed written consent was obtained from each participant. Participants were informed about their right to withdraw from participation during the informed consent process.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]12 W Madison St, Baltimore, MD 21201, USA. [2]530 Gaither Road, Suite 500, Rockville, MD 20850, USA. [3]Ministries, Ghana Health Service, PMB, Accra, Ghana.

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